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Home Teaching: Effect on Compliance, Hospital Readmissions and Days of Rehospitalization for Patients with Chronic Congestive Heart Failure

Betty Sue Holliday Ashby
bhrouda804@aol.com

School of Education
Virginia Commonwealth University

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[redacted]
Director of Dissertation

[redacted]
Committee Member

[redacted]
Committee Member

[redacted]
Committee Member

[redacted]
Committee Member

[redacted]
Director, Ph.D. Program

[redacted]
Dean, School of Education

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Home Teaching: Effect on Compliance, Hospital Readmissions and Days of Rehospitalization for Patients with Chronic Congestive Heart Failure

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By

Betty Sue Holliday Ashby
Diploma, Petersburg General Hospital School of Nursing, 1963
B.S.N., University of Virginia, 1970
M.S., Medical College of Virginia of the Virginia Commonwealth University, 1980

Director: Dr. Jean Lokerson
Professor, School of Education

Virginia Commonwealth University
Richmond, Virginia
May, 1988

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Dedication

I would like to dedicate this manuscript to my late father, Millard Holliday, who instilled the merits of work into my value system at a very young age.

Table of Contents

List of Tables

Table

Abstract

HOME TEACHING: EFFECT ON COMPLIANCE, HOSPITAL READMISSIONS AND DAYS OF REHOSPITALIZATION FOR PATIENTS WITH CHRONIC CONGESTIVE HEART FAILURE

Betty Sue Holliday Ashby, Ph.D.

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Major Director: Dr. Jean Lokerson

This study was conducted to determine the effect of patient teaching in the home setting on compliance to one's home care regimen, number of hospital readmissions, and days of rehospitalization for patients with chronic congestive heart failure. An experimental design was used with subjects randomly assigned either to the experimental or control group. Both groups received traditional education in the hospital setting. In addition, the experimental group received the home health teaching program and the control group received an assessment visit for the purpose of counteracting the Hawthorne effect. Compliance data were collected from both groups by the investigator via telephone interview three months and six months after the initial hospitalizatlion. Data were verified and supplemented by patients' medical records.

The study was guided by the following hypotheses:

1. Patients with chronic congestive heart failure who have home teaching in addition to traditional education in the hospital setting will comply to a greater degree with the treatment regimen, as measured by a Compliance

Assessment Guide, than patients who receive only traditional teaching in the hospital setting.

2. Patients with chronic congestive heart failure who have home teaching in addition to traditional education in the hospital setting will have fewer hospital readmissions for congestive heart failure than patients who receive only traditional education in the hospital setting.

3. Patients with chronic congestive heart failure who have home teaching in addition to traditional education in the hospital setting will have fewer days of rehospitalization for congestive heart failure than patients who receive only traditional education in the hospital setting.

The Student's t test was used to determine if statistically significant differences existed between the two groups on the variables of compliance, number of hospital readmissions, and days of rehospitalization. No significant difference was found between the experimental and control groups on compliance measured by a Compliance Assessment Guide. Statistically significant differences were found between the two groups on the number of readmissions and days of rehospitalization for congestive heart failure. The experimental group had fewer readmissions and fewer days of rehospitalization for congestive heart failure than did the control group. The differences between the two groups on these two variables were attributed to the effectiveness of the home teaching program for the experimental group.

CHAPTER I

INTRODUCTION

The twentieth century has brought remarkable medical and public health advances. The result, however, has not been "a state of complete physical, mental, and social well being..." (Sorensen & Luckmann, 1986, p. 159), the World Health Organization's definition of health. There has only been a shift in the incidence of diseases. The prevalence of infectious diseases has decreased while increased longevity and increased stress has resulted in increased prevalence of chronic diseases (Sorensen & Luckmann, 1986).

Of the chronic diseases, heart and blood vessel diseases are the leading cause of death and disability. An estimated 63,400,000 Americans had one or more forms of heart or blood vessel disease in 1987. Hypertension is the most prevalent of these diseases, followed by coronary artery disease, rheumatic heart disease and cerebrovascular accidents, respectively (American Heart Association: Heart Facts, 1987). Of the persons with heart disease, 50 to 60 percent will develop congestive heart failure (Luckmann & Sorensen, 1980).

Congestive heart failure is the end stage of heart disease. It develops when the heart muscle lacks strength to pump blood adequately through the circulatory system of

the body. The heart continues to function, although at a less efficient level. The result is an inadequate supply of oxygen and nutrients to meet the cellular needs of the body (Bullock & Rosendall, 1984).

Medical treatment for congestive heart failure involves a combination of rest, diet, modified daily activities, and drugs. Components within the treatment regimen may vary, depending on the underlying pathophysiology (American Heart Association, Heart Facts: 1985). Thus, treatment must be individualized for each patient.

The chronicity of congestive heart failure makes treatment a lifelong process (Shamonsky, Cecere, & Shellenberger, 1984). "To ensure that the patient will persevere in his therapy requires patient education, involvement and cooperation" (Brunner & Suddarth, 1984). Potter and Percy (1985) note that as hospital stays become shorter nurses must start early in the hospitalization period to prepare patients for home care. Waxler (1976), however, states that for patients with congestive heart failure, "in most circumstances the teaching that occurs in the hospital setting needs reinforcement in the home with the use of a visiting nurse and during outpatient visits in offices and clinics" (p. 303).

During hospitalization, the patient with congestive heart failure is acutely ill. Wolff, Weitzel, and Zsohor

(1983) note that acutely ill patients are rarely ready or motivated to participate in a teaching learning program. Not only must patients with congestive heart failure cope with physical problems, they must also adapt psychosocially to being ill. There must be adaptation to a changed body image, permanent alterations in life-style (Luckmann & Sorensen, 1980) and decreasing financial resources. No one can be completely prepared ahead of time for these problems (Burckhardt, 1987).

Psychosocial adaptation models present adaptation as a sequence of stages. Each stage of adaptation influences patient readiness to learn (Redman, 1976). The stage most conducive to learning may not occur until about the time patients are physically ready for hospital discharge, or even after discharge has already occured (Walsh, 1982). Therefore, patients may need additional teaching in the home setting to gain sufficient knowledge to adequately care for thenselves.

Patients should not only have knowledge of the treatment regimen, but also of the disease process. Marsh and Pearlman (1972) found, in their study of patients with congestive heart failure, that a lack of understanding of the disease process was significantly correlated with medication noncompliance. Medication noncompliance or noncompliance with other aspects of the treatment regimen may precipitate decompensation requiring rehospitalization

(Luckmann & Sorensen, 1980). Several studies (Gibson, 1966; Farag & Mozar, 1967; Hanchett & Torrens, 1967) have shown that the number of hospital readmissions or days of rehospitalization for patients with congestive heart failure could be decreased by adding intermittent continuing care by home health nurses to the already existing ambulatory care. During these visits the major functions performed by the nurses were patient education and encouragement to comply with the treatment regimen.

No published study has been identified that examines the effect of adding to ambulatory care a one-time home visit program for the purpose of patient education. Such home visits made during the appropriate psychosocial stage of adaptation should be conducive to patient learning. The knowledge gained about the disease process and treatment regimen should promote compliance, decrease readmissions and decrease rehospitalization days.

Statement of Purpose

The purpose of this study was to determine the effect of patient teaching in the home setting on compliance to one's home care regimen, the number of hospital readmissions, and the days of hospitalization for patients with chronic congestive heart failure.

Hypotheses

1. Patients with chronic congestive heart failure who receive home teaching in addition to the traditional education in the hospital setting will have a significantly higher score on the Compliance Assessment Guide than patients who receive teaching only in the hospital setting.

2. Patients with chronic congestive heart failure who receive home teaching in addition to the traditional education in the hospital setting will have fewer readmissions to the hospital for congestive heart failure over a six-month period following home teaching than patients who receive only the traditional education in the hospital setting.

3. Patients with chronic congestive heart failure who receive home teaching in addition to the traditional education in the hospital setting will have fewer days of rehospitalization for congestive heart failure over a six-month period following home teaching than patients who receive only traditional education in the hospital setting.

Chapter II

REVIEW OF THE LITERATURE

The focus of this study was the effect of patient teaching in the home setting on compliance, the number of hospital readmissions and the days of rehospitalization, for patients with chronic congestive heart failure. The review of the literature included information and studies related to congestive heart failure, patient education and compliance.

Congestive Heart Failure

Parys (1987) noted that "You can't fix something that is broken unless you understand how it works in the first place" (p. 42). Thus, as a basis for understanding the pathophysiology of congestive heart failure, the anatomy and physiology of the normal cardiovascular system was discussed first. The pathophysiology of congestive heart failure was then be presented, followed by an overview of relevant medical treatment and nursing interventions.

Anatomy and Physiology of the Cardiovascular System

The cardiovascular system is composed of three

subsystems. One subsystem is the systemic system which supplies blood to the body as a whole. The second subsystem is the pulmonary system which carries blood to the lungs for oxygen and carbon dioxide exchange. The third subsystem of the cardiovascular system is the coronary system which supplies blood to the heart muscle. These subsystems perform their roles through the functions of the heart and blood vessels. The heart functions as a pump while the blood vessels function as ducts to transport the blood.

The blood vessels are of three major types. In the systemic and coronary systems, the arteries carry oxygenated blood away from the left ventricle of the heart and toward the body cells. As the arteries divide and become smaller, they are termed arterioles. The arterioles subsequently divide into capillaries where the exchange of oxygen and nutrients for carbon dioxide and waste products at the cellular level occurs. From the capillaries blood flows into venules which join to become veins. Veins carry unoxygenated blood back to the right atrium of the heart (Turner, 1985).

In the pulmonary system, unoxygenated blood is pumped from the right atrium of the heart into the pulmonary arteries. It travels to the capillaries of the lungs where carbon dioxide diffuses out of the blood and oxygen diffuses into the blood. The oxygenated blood returns to

the left artium of the heart via the pulmonary veins (Turner, 1985).

The Heart

The heart is a unique organ in that its sole function is the purely mechanical one of pumping blood. The muscle tissue composing the walls of the heart is the most concentrated muscle of the body. The durability of the heart is demonstrated by the fact that under normal conditions it beats approximately 60 times per minute, 3,600 times an hour and 86,400 times a day for the lifetime of a person (Sanderson, 1983). In times of stress such as occurs with vigorous exercise, strong emotions and illness, an increase of four to five times the normal workload of the heart is required (Abel, 1982).

Anatomy of the heart. The heart is a hollow, cone-shaped structure located slightly to the left of the middle portion of the thorax. The sternum, ribs, and vertebral column give it protection. The right and left lungs flank the heart (Sanderson, 1983). The length of the heart from base to apex is approximately nine centimeters and its weight is approximately 300 grams in men and 225 grams in women (Turner, 1985).

The heart is contained in a fibrous sac with a serous lining called the pericardium. A few milliliters of

pericardial fluid promotes free cardiac motion and prevents external trauma from being transmitted directly to the heart.

Three layers of tissue compose the heart. The epicardium, the outermost layer of the heart, covers the surface of the heart and extends on to the great vessels adjoining the heart, where it becomes continous with the inner layer of the pericardium. The myocardium is the muscular portion of the heart and composes the middle layer. The endocardium is the innermost layer of the heart. It is a thin delicate layer of tissue which lines the cardiac chambers and covers the surface of the cardiac valves (Sanderson, 1983).

Within the heart, there are four chambers, the right and left atria and the right and left ventricles. The atrial chambers receive blood from the great vessels and have relatively thin walls. The ventricles pump the blood and have relatively thick walls, the left thicker than the right. The right and left sides of the heart are completely separated by two septa. Valves separate each atrium from its corresponding ventricle (Turner, 1985) and allow only unidirectional blood flow. Valves open and close passively in response to pressure changes within the chambers (Hole, 1984).

The right atrium receives unoxygenated blood from the systemic circulation. Blood from the head and upper

extremities enters the right atrium through the superior vena cava; blood from the abdominal viscera and lower extremities enters through the inferior vena cava. Blood from the circulation of the heart enters through the coronary sinus. Blood from the atrial walls themselves, enters through the Thebesian veins. The interatrial septum separates the right atrium from the left atrium.

The tricuspid valve separates the right atrium from the right ventricle. Blood flows from the right atrium through the tricuspid valve into the right ventricle. The right ventricle pumps blood through the pulmomic valve into the pulmonary artery to be oxygenated in the lungs.

Oxygenated blood from the lungs is received into the left atrium through the right and left superior and inferior pulmonary veins. Blood flows from the left atrium through the mitral valve into the left ventricle. The left ventricle pumps the oxygenated blood through the aortic valve into the aorta to be distributed to all parts of the body.

The heart tissue receives its blood supply from the right and left coronary arteries which exit from the base of the aorta. The right coronary artery supplies blood to the inferior wall of the myocardium. The left coronary artery separates into two major branches, the left anterior descending artery and the circumflex artery. The left anterior descending artery supplies blood to the anterior

wall and anteroseptal area of the myocardium. The posterior wall of the myocardium receives its blood supply from the circumflex artery.

Cardiac nerves transmit impulses to and from the heart. The sinoatrial node, located at the junction of the superior vena cava and right atrium, is the site of impulse formation for cardiac contraction. The sinoatrial node receives impulses from both the sympathetic and parasympathetic nervous system.

From the sinoatrial node, impulses travel through the atria to the atrioventricular node, then to the bundle of His located at the junction of the atrial and ventricular septa. As the bundle of His reaches the upper portion of the interventricular septum it divides into the right and left bundle branches. These branches descend through the interventricular septum and terminate in the Purkinje fibers. Thus, from the bundle of His, impulses travel through the right and left bundle branches to the Purkinje fibers which carry impulses to the ventricles.

Sympathetic nervous system impulses to the sinoatrial node increase the heart rate while parasympathetic nervous system impulses decrease the heart rate. Nerve impulses leaving the heart, travel through the sympathetic plexus to the lower two cervical and upper four thoracic ganglia of the spinal cord. Because this level of the spinal cord also receives impulses from the neck, jaw, shoulders and

arms, cardiac pain is often experienced as pain in these areas (Sanderson, 1983).

Physiology of the Heart. Physiologically the heart is two pumps working simultaneously. The right side of the heart receives unoxygenated blood from the body and pumps it through the pulmomary arteries to the lungs for oxygenation. The left side of the heart receives the oxygenated blood from the lungs via the pulmonary veins and pumps it out to the body through the aorta (Hole, 1984). Pumping of the heart occurs in two phases called the cardiac cycle. Two-thirds of the cycle occurs during the diastolic phase when the ventricles relax and fill with blood. One-third of the cycle occurs during the systolic phase when blood is ejected from the ventricles.

At the beginning of the diastolic phase, electrical impulses from the sinoatrial node travel through the atria to the atrioventricular node causing the atria to contract. Pressure becomes higher in the atria than in the relaxed ventricles. The pulmonic and aortic valves close and the atrioventricular valves open. Blood then flows from the atria into the ventricles.

The electrical impulse continues to travel through the subsequent cardiac nerves causing the ventricles to contract. Ventricular contraction leads to an increased pressure in these chambers. The atrioventricular valves close and the aortic and pulmonic valves open. Blood is

thrust from the right ventricle into pulmonary arteries and from the left ventricle into the aorta. When ventricular ejection stops, the aortic and pulmonic valves close and the cardiac cycle begins again.

The cardiac cycle can be depicted by several modalities. The electrical activity of the heart is recorded as an electrocardiogram. The heart sounds that occur when the various valves close during the cardiac cycle can be recorded as a phonocardiogram. The pressure changes occurring in the left atrium, left ventricle and aorta during the cardiac cycle can be reflected in a pressure tracing. Variations from normal can be detected with these modalities and usually indicate cardiac pathology (Sanderson, 1983).

The heart is able to propel blood throughout the body because it has the ability to contract. Proper contractility requires an intact electrophysiological conduction system and a functional myocardium. Contractility of the heart can be measured by the cardiac output. Cardiac output is the volume of blood ejected per minute by the left ventricle into the aorta and by the right ventricle into the pulmonary veins (Abel, 1982). It is calculated by measuring the stroke volume, which is the volume of blood pumped with each heart beat, and multiplying it by the heart rate (Patrick, Woods, Craven, Rokosky, & Brumo, 1986). Cardiac output, including both

the stroke volume and pulse rate, must vary in response to the internal and external demands made upon it.

Stroke volume is influenced by preload, afterload and the contractile state of the heart. Preload is the length of the left ventricular myocardial fiber at the end of the diastolic phase of the cardiac cycle. According to the Frank-Starling law of the heart, the greater the length of the fiber, the greater the force of contraction, unless over distension of the myocardium occurs. Afterload is the resistance against which the left ventricle must pump. Arterial blood pressure, left ventricular size, and the condition of the valves determine afterload. The contractile state of the heart is the force of contraction created by the myocardium, independent of the preload. An inherent property of the myocardium is the ability to alter the contractile state.

The heart rate normally is 60-90 beats per minute. Variations in rate occur in response to many factors. Exercise and strong emotions increase the heart rate. Large individuals usually have a slower rate than small individuals. Adults have a slower heart rate than a fetus; men have a slower rate than women. The hormones epinephrine, norepinephrine and thyroxine increase the heart rate, while acetylcholine slows the rate. Fever and hypotension also increase the heart rate.

Several regulatory mechanisms are responsible for

adaptation of the cardiac output to internal and external demands. One regulatory mechanism that promotes this adaptation is the autonomic nervous system. It is subdivided into the parasympathetic and sympathetic nervous systems, which yield opposing involuntary responses. Stimulation of the parasympathetic nervous system evokes the release of the neurotransmitter acetylcholine which has an inhibitory effect on the cardiovascular system. The result is a decrease in pulse rate and a decrease in myocardial contractility. Stimulation of the sympathetic nervous system evokes the release of the neurotransmitter norepinephrine. This substance has an acceleratory effect on the cardiovascular system producing an increase in heart rate, an increase in myocardial contractility and peripheral vasoconstriction.

Stimulation of the sympathetic nervous system in turn stimulates the adrenal glands. The adrenal glands respond by secreting into the circulation the catecholamines, epinephrine and norepinephrine. These catecholamines interact with adrenergic receptors within cell membranes to have their effect. The effect that is produced depends on the type and location of the adrenergic receptors. There are three types of receptors, alpha, beta 1 and beta 2. Alpha receptors are located in peripheral arteries and veins. They respond to both of the catecholamines and the effect is vasoconstriction. Beta 1 receptors are located

in the heart. They are stimulated by norepinephrine which causes an increase in heart rate and an increase in myocardial contractility, each of which may result in an increased cardiac output and an increased blood pressure. Beta 2 receptors are located in arterial and bronchial walls. They are stimulated by epinephrine with the response being bronchodilation and arterial vasodilation.

A second regulatory mechanism to promote adaptation to internal and external demands is cardiovascular reflexes. These reflexes include the baroreceptors, the stretch receptors, and the chemoreceptors. Baroreceptors are pressure sensitive nerve endings located in the walls of the aortic arch and carotid sinuses. An increase in arterial pressure increases the impulses sent to the medulla oblongata causing a decrease in arterial pressure and a decrease in heart rate; a decrease in arterial pressure has the opposite effect. Stretch receptors are pressure sensitive nerve endings located in the terminal vena cava and right atrium which reflect blood volume changes. When blood pressure decreases, fewer impulses are sent to the central nervous system with the result being vasoconstriction and an increased heart rate; an increase in blood pressure reflecting hypervolemia has the opposite results. Chemoreceptors are chemically sensitive nerve endings located in the walls of the aortic arch carotid bodies. Primarily these nerve endings are sensitive to

hypoxemia and secondarily to increased carbon dioxide and decreased pH. Stimulation of chemoreceptors sends impulses to the central nervous system resulting in increased respirations.

A third regulatory mechanism to promote cardiovascular adaptation to internal and external demands is the hormonal activity of the antidiuretic hormone and the renin-angiotension-aldosterone mechanism. The antidiuretic hormone is produced by the posterior pituitary gland and secreted in response to blood volume. An increase in blood volume would cause a decrease in the antidiuretic hormone and promote diuresis; the opposite occurs with a decrease in blood volume.

The renin-angiotension-aldosterone mechanism affects blood volume and blood pressure. Renin is an enzyme produced by the kidney and released in response to a decreased renal blood flow and stimulation of the sympathetic nervous system. Renin converts angiotensinogen, a globulin present in the blood, to angiotensin I. Conversion of angiotensin I to angiotensin II occurs in the lungs. Angiotensin II is a potent vasoconstrictor and stimulates the release of aldosterone from the adrenal cortex. Aldosterone promotes sodium and water retention by the kidneys thus increasing blood volume. Each effect, the vasoconstriction and the increase in blood volume, promotes an increase in blood pressure (Guyton, 1976).

These three mechanisms are able to maintain relatively normal heart functions even when substantial heart pathology exists. Each of these mechanisms has limitations, however, and eventually fail. The consequence of this failure is congestive heart failure (Braunwald, 1984, Pathophysiology).

Pathophysiology of Congestive Heart Failure

Marianne Sherman (1984) defined heart failure as "the inability of the heart to supply an adequate cardiac output in order to meet the body's metabolic demands" (p. 60). Eugene Braunwald (1987) described heart failure as the "the condition in which an abnormality of cardiac function is responsible for the inability of the heart to pump blood at a rate commensurate with the requirements of the metabolizing tissues or can do so only from an abnormally elevated filling pressure" (p. 902). Heart failure occurs as the end stage of cardiac disease after the myocardium has used all of its reserve (Braunwald, 1984, Clinical).

The problems that lead to congestive heart failure can be categorized into three groups as follows: "(1) Volume or preload problems that result from diseases that increase the volume of blood to be pumped by the heart on a chronic basis, (2) Pressure or afterload problems that result from diseases that increase the resistance against which the heart must pump blood, (3) Primary ventricular muscle problems that result from pathological conditions that

affect the myocardial tissue directly" (Cheitlin, 1984).

The first group, volume or preload problems, may be caused by aortic, mitral or tricuspid valve incompetence, over-transfusion, left to right heart shunts, and secondary hypervolemia. The second group, pressure or afterload problems, may be caused by aortic stenosis, coarctation of the aorta and primary or secondary hypertension (Patrick, Woods, Craven, Rokosky, & Bruno, 1986). Pulmonic valvular stenosis and pulmonary hypertension may also cause after-load problems (Luckmann & Sorensen, 1987).

The third group of problems that lead to congestive heart failure, primary ventricular muscle problems, includes myocardial infarction, cardiomyopathy, myocarditis, coronary artery disease, ischemia, infection, arrhythmia and toxic disorders. Additionally cardiac tamponade or restrictive pericarditis may hamper ventricular filling and myocardial contractility (Patrick, Woods, Craven, Rokosdy, & Bruno, 1986). Braunwald (1984) concluded that a "principal complication of virtually all forms of heart disease is heart failure..." (p. 488).

Mild to moderate heart disease may be present without evidence of heart failure because the regulatory mechanisms are adequately maintaining cardiac output. Undue stress, however, may overtax the compensatory mechanisms and precipitate heart failure. Undue stress may be instigated by infection, anemia, hypertension, arrhythmia, increased

salt intake, and progression of heart disease such as occurs with myocardial infarction (Zema, 1986). Undue stress may also be caused by physical overexertion, excessive environmental heat or humidity, and emotional crises (Braunwald, 1987).

Congestive heart failure may be acute or chronic. With acute heart failure there is sudden appearance of symptoms such as may occur after a myocardial infarction. With chronic heart failure the symptoms appear over a period of weeks or months (Sherman, 1984). There is gradual enlargement and loss of contractility of a damaged heart chamber (Parys, 1987).

Heart failure may involve the left side, the right side or both sides of the heart. When one side of the heart is involved, usually, progression occurs, resulting in involvement of both sides.

With left sided heart failure, there is left ventricular overload. To compensate for the overload, ventricular hypertrophy occurs along with dilation of the ventricle. Hypertrophic muscle cells lose their resilience and the muscle becomes stiff. Dilation of the ventricle stretches the muscles beyond optimal length. Both of these factors contribute to the small stroke volume and low cardiac output associated with left ventricular failure.

The small stroke volume and low cardiac output cause a rise in both the left ventricular end diastolic volume and

left ventricular end diastolic pressure. With each subsequent atrial contraction, volume and pressure continue to increase in the left ventricle and consequently increase in the left atrium. As the process continues, the atrium becomes unable to deliver its volume into the left ventricle. Thus, the volume backs up into the pulmonary system.

Increased blood volume and hence pressure in the pulmonary system cause the pulmonary vessels to enlarge. This backward process continues, resulting in increased capillary permeability followed by the forcing of fluid from the blood into the alveoli of the lungs. As the lungs fill with fluid, less space is available for air. Patients complain of shortness of breath (Sherman, 1984).

Dyspnea is one of the most common symptoms of congestive heart failure. The degree of dyspnea gives an indication of the severity of the heart failure and has been divided into four grades as follows:

> Grade 1 Mild - occurs with usual exertion such as running or walking uphill.
> Grade 2 Moderate - occurs walking on the level.
> Grade 3 Severe - walking impossible, even slowly on the level.
> Grade 4 Gross - so breathless that the patient is practically confined to bed (Turner, 1985 p. 41).

If the process of heart failure progresses, respiratory failure from pulmonary edema results in hypoxia, a build up of carbon dioxide in the body.

Hypoxia from respiratory failure adds to the existing

low cardiac output to cause tissue anoxia. The anoxia stimulates the sypathetic nervous system to increase the heart rate and contractility. Because the heart cannot meet its own oxygen demands, myocardial contractons become weaker and cardiac output is lowered even more (Sherman, 1984).

As the cardiac output is lowered, all body cells have decreased circulation or perfusion (Turner, 1985). Decreased perfusion of the skeletal muscles leads to fatigue and weakness. Confusion, impairment of memory, headache and insomnia may occur as a result of poor perfusion of the brain (Braunwald, 1984, Clinical). The kidneys are affected more by a lowered cardiac output than any other organ (Turner, 1985). Decreased perfusion to the kidneys leads to sodium and water retention as a result of the decreased glomerular filtration rate and stimulation of the renin-angiotension-aldosterone mechanism (Reuther & Hansen, 1985). The retention of fluid is a compensatory mechanism meant to increase the cardiac output.

The retention of fluid, instead, increases venous return to the right atrium. This additional fluid, thus, increases the workload of an already overworked right ventricle. The pulmonary circulation already has increased volume and pressure from the back-up related to the left sided failure. Consequently the muscles of the right ventricle probably already have some hypertrophy and

dilation. The additional volume from sodium and water retention increase the work load for the right ventricle even more.

When pressure increases in the right ventricle to the point that it is no longer able to empty its volume into the pulmonary circulation, right ventricle failure has occurred. Pressure increases in the right atrium and venous return is hampered. Venous pressure in the systemic circulation rises. The osmotic pressure which normally keeps fluid in the peripheral venous capillaries, is overcome by the hydrostatic pressure from the increased venous pressure with the result being edema (Turner, 1985).

Edema occurs in the liver and may produce signs of liver failure such as jaundice and ascites (Sherman, 1984). Edema of the liver, in combination with congestion of the intestines leads to anorexia that may progress to cardiac cachexia (Braunwald, 1984, Clinical). Edema occurs in the dependent parts of the body such as the lower extremities when the patient is sitting or standing. The increased venous pressure may also be evidenced by distended jugular veins (Sherman, 1984).

The progression of heart failure from left ventricular failure to right ventricular failure has been described. Heart failure may progress from the right side to the left side of the heart. The process is the same except that the order of events is reversed.

Braunwald (1984, Clinical) notes that patient reduction in intensity of therapy is probably the most common precipitating factor for decompensation of a previously compensated heart failure. Usually a combination of increased salt intake, increased physical activity or alteration in the drug regimen is the culprit. The patient who is asymptomatic on his treatment regimen may precipitate cardiac decompensation by incorrectly assuming that he is cured, and voluntarily relaxing the intensity of the regimen. Holidays, vacations or a change of cooks, for example, can often lead to excessive sodium intake and a bout of congestive heart failure.

To aid in describing the severity of heart disease, the New York Heart Association Functional Capacity Classification was developed. It reflects four classes of heart disease as follows:

> Class I: No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea or anginal pain.
> Class II: Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in fatigue, palpitation, dyspnea or anginal pain.
> Class III: Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes fatigue, palpitation, dyspnea or anginal pain.
> Class IV: Unable to carry on any physical activity without discomfort. Symptoms of cardiac insufficiency or of the anginal syndrone may be present even at rest. If any physical activity is undertaken, discomfort is increased (Sokolow, 1986, p. 179).

This classification system is used to describe the

severity of congestive heart failure as well as other heart diseases and serves as a basis for intensity of therapy.

Treatment for Patients with Chronic Congestive Heart Failure

Smith and Braunwald (1984) have identified three general approaches to the treatment of heart failure. The first approach is to remove the underlying cause either surgically or with medical treatment. The second approach is to remove the precipitating cause. For example, if an infection has precipitated the heart failure, then the approach to the treatment of the heart failure is to treat the infection. The third approach to the treatment of heart failure is control of the congestive heart failure state. The first and second approaches are considerations when the heart failure is acute. For chronic congestive heart failure, the third approach, control of the congestive heart failure state, is emphasized.

Control of the congestive heart failure state is directly related to the pathophysiology. Eleven pathophysiologic factors affecting the circulatory system in chronic congestive heart failure have been identified and are the basis for therapeutic intervention. These factors are:

> (1) increased sympathetic tone, (2) elevated blood volume, (3) redistribution of blood flow, (4) fall off in systemic blood pressure and concomitant rise in wedge pressure and right atrial pressure, (5) increased systemic vascular resistance, (6) decreased cardiac

> output, (7) elevated renin and aldosterone levels, (8) diminished reflex sensitivity of the baroreceptors, (9) peripheral vasoconstriction and diminished peripheral vasodilation, (10) elevated heart rate, and (11) decreased myocardial contractility (To Rescue a Failing Heart: When Failure is Chronic, 1983, p. 200).

Generally treatment of heart failure is not needed until the patient enters Class II of the New York Heart Association Functional Capacity Classification (Smith & Braunwald, 1984). Then the first step in therapy is to decrease the workload of the heart. Bedrest is effective, but should be instituted only until the acute symptoms have subsided. Avoidance of excessive mental, emotional and physical stress also decreases the work load of the heart. If the patient is hypertensive, the blood pressure needs to be lowered (To Rescue a Failing Heart: When Heart Failure is Chronic, 1983). If the patient is obese, weight reduction efforts should be implemented (Smith & Braunwald, 1984). In addition, reduction of salt in the diet will decrease fluid retention and thus decrease the workload of the heart (To Rescue a Failing Heart: When Heart Failure is Chronic, 1983). Limiting fluid intake to two quarts per day may also be recommended at this time (Franciosa, Jelliffe, Levine, Likoff, & Ribner, Intervening, 1987).

If the supportive measures have not relieved the symptoms of heart failure, consideration should be given to the use of diuretics. Diuretics decrease the workload of the heart by decreasing blood volume. Milder diuretics

such as the thiazides may be used first. If the elevated blood volume does not decrease, then more potent ones can be used.

After the diuretic therapy, if symptoms of heart failure still persist, a digitalis preparation should be prescribed. Digitalis is an inotropic preparation which stimulates contractility of the myocardium, thus increasing the cardiac output. Increasing cardiac output promotes diuresis and helps to relieve symptoms associated with heart failure (To Rescue a Failing Heart: When Heart Failure is Chronic, 1983).

If symptoms of congestive heart failure persist after the above treatment regimen has been implemented, the patient probably is in Class III of the Functional Categories (Smith & Braunwald, 1984). Further treatment would include administration of oxygen and the use of vasodilator drugs. Peripheral vasodilation can be attained through the use of beta 2 agonist such as albuterol and perbuterol. An arteriolar dilator drug such as hydralizine may be used to effect an increase in cardiac output. For venodilation, the prototype drug is nitroglycerin. Because veins hold about 75 percent of blood volume at any point in time, in patients with intense vasoconstriction from increased sympathetic tone, dilating the veins will cause redistribution of the blood away from the chest. Right atrial pressure and pulmonary capillary wedge pressure

decrease as a result (To Rescue a Failing Heart: When Failure is Chronic, 1983). Venodilators, however, do not increase cardiac output and arteriolardilators do not decrease right atrial pressure and pulmonary capillary wedge pressure (Forrester & Staniloff, 1984). Some relatively new drugs have both venodilating and arteriolardilating properties. However, the side effects prevent them from being used very frequently. Prazosin and Captopril are examples of these drugs.

With Stage IV heart failure, all of the previous modes of therapy are maximized. When symptoms still persist, hospitalization is usually required (Smith and Braunwald, 1984). The patient is acutely ill at this time and generally displaying symptoms of cardiogenic shock. These symptoms include hypotension, urinary output of less than 20 cubic centimeters per hour, a compromised respiratory status and a changed mental status (McCauley, Isacson, & Schulz, 1984). Additional medications include inotropic agents such as dopamine and dobutamine given intravenouly (Smith & Braunwald, 1984). If these agents fail to restore hemodynamic stability, an intra-aortic balloon pump may be inserted (McCauley, Isacson, & Schulz, 1984). Vasodilators such as nitroprusside may also be given intravenously at this time. If failure persists specialized measures such as thoracentesis, paracentesis or dialysis may be used to remove excess fluid. Cardiac transplantation may be

considered (Smith & Braunwald, 1984).

As can be noted from the details of the treatment regimen for patients with congestive heart failure, after instituting bedrest and prescribing a low sodium diet, medications are the mainstay of treatment. The degree of heart failure and the varying individual responses to aspects of the treatment regimen will influence the number and type of medications required. Thus, each patient with congestive heart failure will have an individualized treatment plan.

NURSING CARE FOR PATIENTS WITH CHRONIC CONGESTIVE HEART FAILURE

From the standard nursing diagnosis nomenclature, the typical nursing diagnoses for a patient with congestive heart failure are impaired gas exchange, inadequate cardiac output related to ventricular dysfunction, alteration in fluid balance related to pulmomary congestion, anxiety related to illness and hospitalization, knowledge deficit related to illness, and alteration in self concept related to illness (Searle, 1986). Each of the diagnoses must be addressed at some point during the course of illness.

Acute Care

In the acute care setting several immediate nursing interventions are required to promote optimal heart functioning and optimal patient comfort. Bedrest or chair

rest in the Fowlers position decreases cardiac workload and promotes respiratory function. Oxygen is given by mask or nasal cannula (Heggie, 1980). Activities are paced and rest periods are planned to prevent excessive exertion. The patient is shielded from emotional stress; family members are told not to bring their problems to the bedside (Parys, 1987). An alternating air mattress and frequent position changes will help prevent skin breakdown potentiated by edema and immobility. Medications given with knowledge of effects and side effects are essential (Heggie, 1980).

Anxiety must be relieved since it precludes psychological rest and thus physical rest (Heggie, 1980). The anxiety may be related to leaving home and being hospitalized or it may be related to being subjected to a new treatment regimen for the congestive heart failure (Wilson-Barnett, 1986). The nursing staff assists by maintaining a calm environment and being available to encourage verbalization of fears (Heggie, 1980). Discussions which include information giving may relieve anxiety related to the disease process and treatment regimen (Wilson-Barnett, 1986). Playing soft music may also have an anxiety reducing effect (McCauley, Isacson, & Schulz, 1984).

Continuous assessment of the patient's condition is an essential nursing function. Assessment for changes in the patient's cardiovascular status reflects the effectiveness

of the treatment regimen. The heart is assessed by auscultation for rate, quality, rhythm, and abnormal heart sounds. The pulse is assessed for rate, quality, and rhythm. The jugular veins are observed for distension with the bed in a semi-Fowlers position. The vital signs are monitored for stability. Exertional dyspnea, orthopnea, and paroxysmal nocturnal dyspnea are indicators of a compromised respiratory status. Other ominous respiratory symptoms include lip and nailbed cyanosis as well as rales and rhonchi heard in the lungs with auscultation. Evidence of the compensatory mechanism of salt and water retention must be assessed. A decreasing urinary output, pitting edema of the feet, legs, or sacrum and ascities are evidence of the functioning of this mechanism. In addition, congestion of the gastrointestional tract caused by salt and water retention is evidenced by the patient's complaint of anorexia, nausea, vomiting, abdominal pain, or feeling of fullness after eating. When assessment data indicates that the patient's condition is worsening, the physician should be consulted. Alterations in the treatment regimen may be indicated (Parys, 1987).

As the patient's condition improves, activity level is increased, based on tolerance. One means of evaluating tolerance is by pulse variance. If an activity causes the pulse to elevate more than 30 beats per minute above the preactivity rate, the patient should rest. No other

activity should be started until the pulse has decreased to the preactivity rate (Parys, 1987). The patient should also be observed for shortness of breath, pallor, and diaphoresis (Heggie, 1980).

Patient Teaching

Of particular importance to this study are the patient teaching aspects of patient care. Simonds (1967) noted that "it has become increasingly clear that careful teaching regarding post-hospitalization behavior of these patients (patients with cardiovascular disease) influences not only their compliance with medical regimens, but it may influence the degree of wellness and the level of functioning they achieve. It may also be a significant factor that affects their potential for readmission to the hospital and the final outcome of their illness"(p. 131).

Tucker et al. (1984) have identified patient teaching discharge outcomes as follows:

Insure that the patient and/or significant other knows and understands:
- Nature and cause of disease process
- Importance of maintaining daily activity plan -
  - Alternate exercise and other activities with rest periods
  - Avoid fatigue
- Importance of maintaining prescribed diet and fluid amounts
- Need to avoid persons with infections, especially URI (Upper Respiratory Infections)
- Importance of daily weight - weigh at same time and with same amount of clothing
- Symptoms of early heart failure to report to physician:
  - Shortness of breath

DOE (Dyspnea on Exertion)
Persistent cough
Swelling of extremities
Sudden weight gain of more than 3 lbs.
Increased nocturia
Name of medications, dosage, time of administration, purpose and side effects
Importance of avoiding extreme temperatures changes
Need to avoid taking over-the counter medications without checking with physician
Importance of on-going outpatient care (pp. 58-59).

Waxler (1976) has identified five areas of content essential for the education of patients with congestive heart failure. These content areas are (1) understanding the disease process, (2) recognizing signs of decompensation, (3) medications, (4) diet, and (5) activity, rest, and other illnesses. Reggie (1980) concured with Waxler (1976) identifying the content areas as (1) the condition of congestive heart failure, (2) activity limits, (3) drug therapy and (4) diet therapy. Discussion of essential content in each of the areas follows.

Diet restriction is one of the earliest treatments implemented for patients with congestive heart failure. The patient is instructed to eliminate the ingestion of sodium from the diet to help control fluid accumulation (Reggie, 1980). The major source of sodium in the diet is table salt, which contains about 40 per cent sodium (Patient Education Aid: Dietary, 1987). One needs to know how to prepare appealing meals using salt substitutes such as lemon juice, herbs and spice mixtures. One needs to know

the foods that are high in sodium so that they can be avoided. Canned and processed foods are high in sodium; fruits, vegetables and meats that are fresh should be used in their stead. If canned foods are used ones that are marked low sodium or no salt added should be purchased (Stanley, 1986).

Patient educators encourage patients with congestive heart failure to make low salt selections of beverage and food and across-the-counter medication. Apple, cranberry or orange juices should be selected instead of tomato juice or vegetable juice cocktail; tea or black coffee instead of cocoa from a mix or instant coffee; and seltzer instead of club soda. Regular cooked cereals instead of instant ones should be selected. Low sodium breads should also be selected (Patient Education Aid: Checking on Salt,1982). When eating out, restaurants should be chosen that offer low salt foods. In additiom to food, some across-the-counter medications including antacids and laxatives are high in sodium content. Patient educators recommend that labels on both food and medication be read so that appropriate selections can be purchased.

In addition to limiting sodium intake, Heggie (1980) recommended limiting fluid intake to two quarts per day to help control fluid accumulation. Thirst can be reduced by sucking on a piece of hard candy or by rinsing the mouth with water (Patient Education Aid, 1987). To monitor the

fluid status, patients should be advised to weigh themselves every day at the same time and on the same scales, realizing that each two pounds in weight gain is equal to retention of one liter of fluid (Heggie,1980). If weight gain is more than a pound on three consecutive days, it may signal the beginning of an acute exacerbation of heart failure and the physician should be consulted (Franceosa et al., Intervening, 1987).

In the advanced stages of congestive heart failure another diet change may be indicated. Circulation to the gastrointestional tract is decreased, resulting in a slowing of the movement of food through the intestines and a feeling of fullness. Small frequent feedings of high protein, high caloric foods that supply adequate bulk is recommended to help compensate for these symptoms (Stanley, 1986).

Because medications are the mainstay of the treatment regimen for patients with congestive heart failure, much teaching is related to this aspect of self care. The name, dosage, time of administration, purpose of the medication, and side effects of each medication need to be taught (Tucker et al.,1984). Cardiac glycosides, diuretics, potassium supplements, and vasodilators are the major drug classifications used by patients with congestive heart failure.

Cardiac glycocides, the digitalis preparations such as

Digoxin, are used to increase the cardiac output in patients with congestive heart failure (Franceosa et al., Intervening, 1987). The margin between therapeutic and toxic doses is narrow, and for that reason, they are very dangerous drugs. Almost one-third of patients taking digitalis preparations develop toxicity and several thousands die from it each year (Meissner & Gever, 1980). Patients should know that the therapeutic margin can be altered by gastrointestional disorders such as nausea, vomiting or diarrhea, kidney or liver disease, and treatment changes that include a revised drug regimen (Meissner & Gever, 1980). Early toxic effects of digoxin are a pulse rate less than 60 beats per minute (Heggie, 1980), nausea, vomiting, and diarrhea. Patients should know that these symptoms must be reported to the physician as soon as they occur so that the dosage can be adjusted before more serious cardiac symptoms develop. In addition, the importance of maintaining regularly scheduled appointments should be stressed. At this time serum levels of the cardiac glycoside can be obtained and regulation of the dosage can be made to assure maximum therapeutic effects, yet prevent toxic effects, can be done.

Diuretics are ordered for the patient with congestive heart failure to control fluid accumulation. They are usually ordered if the combination of low salt diet and limited fluid intake have not been adequate in relieving

the symptoms associated with fluid accumulation (Franciosa et al.. Intervening, 1987). All diuretics increase sodium loss. This electrolyte as well as others are monitored by measuring the level of these substances in the serum (Heggie, 1980). Keeping regularly scheduled appointments is again important. In addition, patients should be aware of the need to report to their physicians a continued weight loss, and dizziness associated with a change in posture from lying to sitting or from sitting to standing. These symptoms may indicate a need to decrease the diuretic dose. A weight gain, again, should be reported as it may indicate an impending acute episode of congestive heart failure.

The relationship between most diuretics and potassium loss in the urine needs to be taught (Franceosa et al., Intervening, 1987). Instructions should include the need to eat foods high in potassium such as bananas, oranges, grapefruits, apricots, dried fruit, meat, potatoes, carrots, celery, and milk (Robinson & Weigley, 1984). Patients should be taught that reporting to the physician as scheduled so that the serum potassium level may be monitored is essential. If muscle weakness and extreme fatigue develop, patients should know to consult the physician, as these are symptoms of a potassium deficit. A potassium supplement may be required if the diet is not maintaining a normal serum potassium level (Franceosa et

al., Intervening, 1987).

Vasodilators are used for the reduction of preload which has the desired effect of increasing cardiac output. All of the vasodilators can cause hypotension and syncope. Feeling faint or dizzy, especially when changing positions from lying to sitting to standing, may occur. Patients should be instructed to change positions slowly but should the symptoms persist, the physician should be consulted. A decrease in dosage may be indicated (Heggie, 1980).

Patients with congestive heart failure are encouraged to develop an exercise program. It has many beneficial results. Psychologically it helps relieve anxiety and depression. Physically exercise helps attain or maintain ideal body weight and optimal cardiovascular function. Weight loss may reduce the need for antihypertensive medications, and the tiredness resulting from exercise may decrease the need for sedatives.

The exercise program must be individualized for each patient and ideally begun under supervision. Patients should be warned to prevent overexertion by spacing activities throughout the day with rest periods in between. Excessive heat or cold should be avoided during exercise because either condition increases the workload of the heart (Stanley, 1986).

If activity restrictions necessitate a job change, the patient should be informed that the local Office of

Vocational Rehabilitation may be helpful. Education and rehabilitation services are also offered by the American Heart Association (Heggie, 1980).

To increase one's resistance against infection, a well balanced diet within the limitations set by the low sodium prescription, and a regular exercise program are important. Patients should also be encouraged to take the influenza shot to bolster their resistance. They should be warned to avoid any one with an upper respiratory infection. Should persons with compensated congestive heart failure become ill, they should know that seeking medical attention promptly may prevent an acute exacerbation. Patients need to be told that over-the-counter medications should not be taken without a physician's permission. For example, many expectorants increase the heart rate, thus increasing heart workload (Stanley, 1986).

The importance of maintaining follow-up appointments to have medication and electrolyte serum levels monitored and to assess for control of the congestive heart failure state has already been stressed. Heggie (1980) noted that "recognizing the early signs of heart failure whether insidious or acute, is the most important thing you can teach your congestive heart failure patient, so he'll be sure to get help when its most needed" (p. 132). Franceosa et al. (1987, Management) concured, stating that "acute episodes can often be miminized or avoided...by doing

some basic testing and by altering the drug regimen at the first signs of deteriorating function" (p. 101). They identify the deteriorating functions as an "increase in weight...of a pound a day for three consecutive days...a marked drop in exercise capacity... and any change in the way a patient feels, from a cold to lethargy..." (p. 101).

Parys (1987) noted that, "considering the life changes the patient faces and his many physical problems," (p.. 49) to insure recovery, arrangements should be made for involvement in a rehabilitation program and visits from a community health nurse. The community health nurse needs information related to the acute episode of congestive heart failure so that plans can be made to "prevent what went wrong from going wrong again" (Prays, 1987, p. 49).

The Teaching-Learning Process

Brunner and Suddarth (1984) posit that meeting the health education needs of the American public is one of the greatest challenges of today's professional nurses. They identify persons with chronic disease as one of the largest groups of people in need of health education and note that the number of people in this category is continually rising. Health education can assist patients with chronic disease to adapt to their illness, cooperate with their prescribed thearpy, learn to solve problems when confronted with new situations and, in addition, prevent

rehospitalization for the same condition (Brunner & Suddarth, 1984).

Knowledge of the teaching-learning process is a valuable tool to assist the nurse in providing health education. Early philosophy and current theories of learning aid in the explanation of the teaching learning process. Because the present study involves health education of adults, only philosophy and theories that have had a major influence on adult education will be reviewed in this review of the literature.

Philosophy and Theories of Learning

Early Catholic philosophers such as Etienne Gibson and Jacques Maritan emphasized the foundation of education as being truth. M. M. Coody, a Catholic teacher, noted that adult education begins with economics. Mortimer Adler, an Aristotelian, emphasized adult learning and suggested that the end of education is to overcome the deficiencies of immaturity (Kidd, 1973).

John Dewey, a late nineteenth and early twentieth century educator, had a tremendous impact on the reshaping of educational goals, curricula, and the social context of thinking and learning. His influence as well as the influence of other experimentalists, such as William Kilpatrick, gave rise to progressive education (Kidd, 1973). Dewey contended that one learns more than is being

studied at the time. This collateral learning includes the formation of attitudes, which probably influences one's future more than the learned subject matter (Cronbach, 1963). Both Dewey and Kilpatrick agreed with the Catholic philosophers and Adler in that education should continue throughout one's life. Kilpatrick emphasized a curriculum based on living, with the goal being self-directing personalities (Kidd, 1973).

Some theories of educational psychology have implications for adult education. The original core of educational psychology was learning and individual differences. Then mental hygiene and child development were added. Later came group relationships and the group process (Cronbach, 1963). Cronbach (1963), however, believed that "the central task of educational psychology is to give teachers an understanding of the way pupils learn" (p. XXI).

He identified seven concepts which are central to the learning process:

> Situation. The situation consists of all objects, persons, and symbols in the learners environment...
> Personal characteristics. These include all the abilities and all the typical responses that the person brings to the situation...
> Goal. The goal of the learner is some consequence that he wishes to attain...
> Interpretation. Interpretation is a process of directing attention to parts of the situation, relating observations to past experiences, and predicting what result various actions will lead to...
> Action. The person's actions include movements and

> statements; they are the observable parts of his response...
>
> Consequence. The consequence may confirm the person's expectations, in which case he is likely to make a similar interpretation in the next such situation...
>
> Reaction to thwarting. Thwarting occurs when the person fails to attain a goal. His reaction may be adaptive. That is to say, he may make a new interpretation and alter his response in a reasonable way. Such adaptive behavior will usually bring a more satisfying consequence. He can also adapt by changing his goal to one he can attain,. The reaction may be nonadaptive: stubborn repetition of the original response, thoughtless variation of the response, or abandonment of goal (Cronbach, 1963, pp. 84-85).

Piaget has postulated a theory of cognitive development and has identified progressive stages. He believed that adaptation is the basis of intellectual functioning. His perception of adaptation is the ability to organize environmental stimuli, and respond in a beneficial manner. Adaptation consists of two processes, accommodation and assimilation (Pulaski, 1971). "When the individual encounters something new that does not fit his existing structure, he accommodates the new by modifying or reorganizing the present structure...When the individual internalizes the changes so that he can handle the new experiences with ease as a part of his own life space, he has been able to assimilate the new" (Lapp, Bender, Ellenwood & John, 1975, p. 176). These two processes, accommodation and assimilation, occur simultaneously and function to promote both physical and cognitive

development.

Equilibrium between assimilation and adaptation is sought; maturation, experience, and educational instructions from parents and teachers provide conflicts which disrupt equilibrium and thereby foster growth. The process of adaptation is constant at all levels of development and stages of cognitive development. The stage of cognitive development at which the adult functions, Piaget termed formal operational. It is "characterized by the logic of propostions, the ability to reason from a hypothesis to all its conclusions, however theoretical. This involves second order operations, or thinking about thoughts or theories rather than concrete realities" (Pulaski, 1971, p, 208).

Ausubel (1968) stated, "If I had to reduce all of educational psychology to just one principle, I would say this: The most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly" (p. VI). What the learner already knows plays a major role in the process of assimilation. Through assimilation, new concepts can be acquired, retained, and organized into a meaningful cognitive structure. This cognitive structure is utilized in problem solving. Problem solving can be facilitated or hampered by one's existing cognitive structure, depending upon whether habit or flexibility prevail (Ausubel, 1968). For the adult, however, the great supply of knowledge in the

cognitive structure outweighs the disadvantages of misinformation and faulty habits (Cronbach, 1963).

Psychological theories of learning can be divided into three categories. One category is the behavioristic learning theories. A second category is the cognitive learning theories and the third category is the humanistic theories of learning. Different assumptions about man, knowledge, and learning formulate the basis for these theories with each theory focusing on a different aspect. (Lindberg, Hunter & Kruszewski, 1983).

Behavioristic learning theories depict learning as a process of making connections through associations. The origin of behaviorism is the conditioned response, a technique developed by Pavlov with his salivating dogs. The founder of behaviorism was John Watson. He proposed that the stimulus-response pattern was the building block of behavior. B. F. Skinner, the father of behavioral technology, concentrated on the role of reinforcement in establishing the desired response. He noted that positive reinforcement increased the frequency of a desired response (Lindberg, Hunter & Kruszewski, 1983). Edward L. Thorndike developed the idea that behavior could be changed through manipulation of the environment (Flynn & Heffron, 1984). Behavior modification programs used in health care and other settings are based on behavioristic learning theories (Lindberg, Hunter & Kruszewski, 1983).

Cognitive learning theories focus on the intellectual processes. The Gestalt and developmental psychologists exemplify these theories. The Gestalt psychologist, Max Wertheimer, and Kurt Lewin were concerned with insight that involved a perceptual reorganization (Lindberg, Hunter & Kruszewski, 1983). They were more concerned about patterns of learning than about a single incident. Lewin is associated with field theory and developed the concept of life-space, the all encompasing environment that determines a person's behavior (Kidd, 1973). Developmental psychologists such as Piaget focused on age-linked stages of cognitive development. Cognitive theory applicable to nursing, is the belief that variation in structure and assistance is needed for different individuals to master learning tasks (Lindberg, Hunter & Kruszewski, 1983).

Humanistic learning theories emphasize one's feelings toward learning. Abraham Maslow and Carl Rogers were psychologists who have contributed to this approach. Maslow has identified a hierarchy of human needs. He postulated that these needs motivate behavior and that lower needs have to be met before higher needs can motivate behavior (Maslow, 1970). Rogers emphasized a personalized approach to learning with the individuality of the learner being accepted and valued (Lindberg, Hunter & Kruszewski, 1983). To implement this theory, an encouraging and accepting environment with multiple people, resources, and material

options is provided. No exams or grades are given. It is assumed that people have a natural tendency to learn (Cross, 1981).

Malcolm Knowles and Associates (1984) have developed a model for adult learning termed the andragogical model. This model is in contrast to the pedagogical model. The basic assumptions about learners for the two models differ greatly. In the pedagogical model, the learner is dependent and submissively carries out the teachers instructions. Learner experience is of little value as a resource for learning; lectures, assigned readings, and audiovisual presentations are the methods used to present the predetermined content. Readiness to learn in the pedagogical model is largely a function of age while orientation to learning is subject centered. Motivation comes from the external pressures of parents and teachers or from competiveness within the classroom.

On the other hand, the andragogical model regards the learner as self-directing. Life experiences are viewed as a rich resource for learning; group discussions, field experiences and problem solving projects are techniques for utilizing them. A need to know, or to perform a task more effectively in real life situations promotes readiness to learn. Orientation to learning is problem centered, life-centered or task centered. In the andragogical model, the most potent motivators for learning are internal.

Self-esteem, self-actualization, and self-confidence are more potent motivators for learning than a better job or an increase in salary. Knowles and Associates (1984) noted that on occasions when content or tasks are totally new, the pedagogical assumptions and strategies are appropriate for adult learners. However, on most occasions, they note that the andragogical model is more appropriate for adult learners.

Walsh (1982) noted that two of the assumptions for andragogy listed above are affected by illess and must be taken into consideration when planning adult education for patients. The concept of the learner is altered because illness causes dependence in contrast to the self-direction experienced by well adult learners. Education can, however, have the effect of changing the dependence back to self-direction. The assumption regarding readiness to learn indicates that one becomes increasingly oriented to the developmental task of one's social roles. When one is ill, this motivation to learn probably will be related to coping with the physical illness rather than social roles.

Principles of Learning and Teaching

From the philosophies and theories of learning, many principles of learning and teaching have been identified. DuGas (1983) has identified ten learning principles relevant to patient teaching as follows:

1. Learning is more effective when it is in response to a felt need on the part of the learner.
2. Active participation on the part of the learner is essential if learning is to take place.
3. Much learning takes place through the mechanism of association.
4. Learning is facilitated when the learner achieves a reward as a result of his behavior.
5. Learning is made easier when the learner understands the fundamental concepts on which material to be learned is based.
6. Learning is made easier when the learner can see the material to be learned as a part of an overall whole.
7. Learning is made easier when the material to be learned is related to what the learner already knows.
8. Learning is made easier when the material to be learned is meaningful to the learner.
9. Learning is retained longer when it is put into immediate use.
10. Learning must be reinforced to be retained (DuGas, 1983, p. 194).

Wilson-Barnett (1985) emphasized two principles of patient teaching. One principle is that individualization is essential. Even though a group may have similar needs to make progress in teaching, major personal concerns must be addressed initially. Picariella (1986) noted also that individual learning sessions allow the personal needs and goals of the learner to be addressed precisely and promotes more active learner participation than can occur in group sessions.

A second principle is that "teaching is a two-way process" (Wilson-Barnett, 1985, p. 28). Plewes (1964), in her description of the characteristics of a good patient educator, stressed the importance of interacting with the

patient and using immediate feedback in the teaching situation. Wilson-Barnett (1985) concured with Plewes (1964) on the principle of teaching being a two-way process. She noted that when planned topics are discussed, questions and concerns may be stimulated. Ideally, these questions and concerns should be discussed at that time. Using praise and talking on the level of the patient enhance the implementation of this two way process (Plewes, 1964).

In contrast to principles of learning and teaching, Ward (1986) identified six obstacles to learning. These obstacles are (1) being overwhelmed by the diagnosis, (2) being too sick to learn, (3) the facts not being the ones wanted, (4) having trouble seeing or hearing, (5) not understanding the English language, and (6) having difficulty learning.

Rice (1983) moved from the principles of patient teaching to the identification of five guidelines for patient education. The first guideline is to know the audience, including language, level of education, and level of motivation. The second guideline is to determine teaching objectives so that time and resources can be used appropriately. The third guideline is to select the appropriate teaching method to convey the information. Miller (1986) suggested, when choosing printed educational material, guidelines for the selection should focus on accuracy, the target audience, and reading level. To

provide an enviromnent conducive to learning is the fourth guideline. Consideration must be given to privacy, room temperature and noise level. The fifth guideline is to evaluate the level of learning. Observations, interviews, questionaires or tests are methods that may be used to evaluate attainment of the teaching objectives. These guidelines are similar to the steps of the nursing process used as an organizing framework by the nursing discipline.

The Nursing Process

The nursing process is a problem solving approach for the delivery of individualized, goal directed nursing care (Rankin and Duffy, 1983) The steps of the nursing process are assessment, analysis, planning, implementation and evaluation (Lindberg, Hunter & Kruszewski, 1983). Quality is assured in this process through the use of protocols and standards (Rankin & Duffy, 1983).

Assessment involves collecting data to determine the needs of individual patients. The learning needs of individual patients may be identified in several ways. The patient may state that he wants to gain knowledge or develop a skill. He may also ask a direct question that identifies lack of knowledge. The nurse may identify a need through observation of the patient's physical condition or behavior (Redman, 1976). In addition, the nurse's understanding of the health problem and the impact of these

on one's life-style has implications for patient education (Rankin and Duffy, 1983).

Assessment involves several aspects. Assessment of the present level of knowledge identifies what a patient already knows, so that the nurse can build on this base. Assessment of the patient's level of comprehension will assist the nurse in developing content at an appropriate level. Assessment of readiness to learn will indicate whether the patient is receptive to listening and adapting to change (Lindberg, Hunter & Kruszewski, 1983). This aspect of assessment will be elaborated on in the next section of this chapter.

Analysis of the data collected in the assessment leads to identification of the patient's learning needs. It is important to include not only the learning needs identified by the patient, but also the learning needs identified for the patient by the nurse (Kozier & Erb, 1983).

The learning needs of the patient are translated into nursing diagnoses. A nursing diagnosis is a statement describing one specific patient need. It may reflect a need for cognitive, psychomotor or affective learning. Stated in this manner, the nursing diagnosis gives direction to individualized nursing interventions (Carpenito, 1983). An example of a nursing diagnosis for a patient with congestive heart failure is "Knowledge deficit related to a low sodium diet." In the planning step of the nursing

process, each area of knowledge deficit is addressed.

Planning includes setting goals or objectives, determining content, and selecting teaching methods (Kozier & Erb, 1983). Once the nursing diagnoses have been stated, learner goals must be developed. These goals must be developed in collaboration with the learner so that they will be realistic. What is realistic for one learner may not be realistic for another because of variations in ability, past experiences, beliefs, and present emotional status. Thus, learner goals will vary among individuals, even when they have the same disease process (Redman, 1976).

Gronlund (1985) listed four factors related to principles of learning that should be considered when writing instructional objectives. One factor is readiness. "Do the students have the necessary experiences and educational background to proceed successfully?" (p. 31) A second factor is motivation. "Do these particular objectives reflect the needs and interests of the student?" (p. 31) A third factor is retention. "Do these particular objectives reflect learning outcomes that tend to be retained longest?" (p. 32) The fourth factor is transfer value. "Do these particular objectives reflect learning outcomes that are widely applicable to new situations?" (p. 32)

Learner goals describe in precise terms the behavior to be attained by the learner as a result of teaching. Stated in this manner, goals describe the expected outcomes

of teaching (Mager, 1962). Gronlund (1970) also emphasizes the appropriateness of stating the objectives as intended outcomes of student behavior at the end of the learning experience. He identified six guidelines for writing instructional objectives as follows:

> 1. Begin each general instructional objective with a verb...
> 2. State each objective in terms of student performance...
> 3. State each objective as a learning product...
> 4. State each objective so that it indicates terminal behavior...
> 5. State each objective so that it includes only one general learning outcome...
> 6. State each objective at the proper level of generality, that is, at a level of generality that clearly indicates the expected learning outcome and that is readily definable by specific types of student behavior (p. 11).

Goals guide the nurse in selecting content to be taught, the sequencing of content and the selection of teaching methods (Redman, 1976).

Learning goals can be classified into three domains of learning. The most effective teaching methods have been identified for each domain. Cognitive learning goals encompass all intellectual behavior. These behaviors include the acquisition of knowledge, comprehension, application, analysis, synthesis and evaluation (Bloom, 1956). Appropriate teaching methods for the cognitive domain include written materials, audiovisual aids, lecture, and discussion (Redman, 1976). Miller (1985) stressed the need to allow adequate time for discussion to validate cognitive learning.

Psychomotor learning goals involve the acquisition of skills that require the integration of mental and muscular activity. Patients who need to learn alternate methods for feeding, dressing or bathing themselves will have psychomotor learning goals (Potter & Perry, 1985). The major behaviors for this domain of learning are perception, set, guided response, mechanism, complex overt response, adaptation, and origination (Simpson, 1972). The most appropriate teaching method for psychomotor learning goals is demonstration by the nurse with a return demonstration by the patient (Redman, 1976).

Affective learning goals describe changes in feelings, emotions, attitudes and interests (Narrow & Buschle, 1982). The behaviors for this domain of learning include receiving, responding, valuing organization, and characterization by a value or value complex (Krathwohl, 1964). For affective learning goals to be met, the patient must "acquire the skills necessary to become aware of his personal values, to acknowledge the significance they hold for him and to show an acceptance of those values. One appropriate teaching method for affective learning goals is therapeutic communication" (Potter & Perry, 1985). Redman (1976) also includes as an appropriate teaching method the nurse acting as a role model.

When the goals of the learner have been determined, the next step is to select the content to be taught. The

content is an outline of the subject matter to be taught (Ryan-Morrell, 1985) and consists of the knowledge, skills, and attitudes that are needed by the patient to attain the goals. Knowledge and expertise of the nurse and other members of the health team provide the basis for patient teaching. Accurate, factual knowledge is essential. Textbooks, professional journals and other related sources can be used as references. In addition, experiences with other patients can contribute to content (Narrow & Buschle, 1982).

According to accepted learning theory, content is ideally organized into a logical sequence, with ideas progressing from simple to complex. Simple facts must be learned before associations can be made. In addition, essential content is taught first. Content that is crucial for the well being of the patient is taught before content that is informative but less crucial (Potter & Perry, 1985).

Content is taught more effectively when an appropriate teaching method is selected. The appropriate teaching method is partially determined by the domain of the learning goals, as discussed previously. Additionally, consideration must be given to the characteristics of the learner. Intellectual ability, developmental level, cultural values and past experience will influence the selection of appropriate teaching methods. Reading ability, visual and hearing ability, and physical ability will also influence

selection of an appropriate teaching method (Lindberg, Hunter & Kruszewski, 1983). Holden (1985) purported that effective teaching involves the use of hearing, seeing, writing and talking, noting that "we learn best when more than one of our senses is stimulated" (p. 29).

To enhance the presentation of content, a variety of teaching aids are available. Posters, pamphlets, audio-visual aids, written instructions, and supplies for teaching skills may be useful (Bigelow-Kemp & Pillitteri, 1984). The teaching aids selected, however, must be congruent with the characteristics of the learner (Woldum, 1985).

The fourth step of the nursing process is implementation. This step includes all of the actions necessary to implement the plans made in the preceeding step (Narrow, 1979). Sensitivity to the response of the patient is an important aspect of implementation. It allows actions to be modified as the teaching pocess is occurring so that the desired outcomes can be achieved (Narrow, 1979). The nurse needs to keep in mind that the key to behavorial change is "integration of learned facts into everyday life" (Rankin & Duffy, 1983).

Bigelow-Kemp and Pillitteri (1984) noted the importance of educating support people for a patient. Should the patient not be able to care for himself or herself, or if the primary care giver is unable to care for the patient as

usual, it is important that someone else be able to give the care. In addition, if someone is going to be responsible for a major segment of the patient's care, for example, cooking, that person must be taught about that segment of the patient's care. When a patient depends on others to assist in his care, he cannot comply with the treatment plan without their educated support (Bigelow-Kemp and Pillitteri, 1984).

The last step of the nursing process is evaluation. Evaluation within the nursing process is an objective-based evaluation. The purpose of the objective-based evaluation is to determine whether the objectives of the teaching program have been achieved. The methodology of an objective based evaluation involves the collection and analysis of performance data relative to each objective specified in the teaching plan (Madaus, Scriven, & Stufflebeam, 1983).

The objective or goal states the criteria to which the patient's performance is compared. If the patient's performance meets the criteria, the objective has been met (Potter & Perry, 1985). If the evaluation indicates that the learning goals were not met, each step of the nursing process must be examined for an explanation. When the area of difficulty has been determined, modifications can be made and represented (Narrow, 1979).

The objective-based evaluation just described is a summative evaluation method (McMillan & Schumaher, 1984).

Process evaluation, which occurs during the process of teaching, is also important (Wolff, Weitzel, Zornow & Zsohor, 1983). Patients' questions and comments, answers to direct questions or observation of the steps in the performance of a skill provides data for process evaluation. Reinforcement of desired learning or correction of the erroneous learning is best provided directly after it is learned (Kozier & Erb, 1983).

Evaluation of the application of knowledge frequently can only be done in the home setting (DuGas, 1983). To evaluate the application of knowledge taught in the hospital setting, a public health referral may be needed, so that a home health nurse can make the evaluation (Atkinson & Murray, 1985). Additional teaching or help in applying the knowledge to daily living situations may be needed (DuGas, 1983). A follow-up phone call to patients is another method of evaluating learning that occurred in the hospital setting (Atkinson & Murray, 1985).

Evaluation is done, not only for the purpose of determining whether the learner has learned, but also to determine how well the teacher has taught. Evaluation should be used by the teacher as a tool for modifying the approach, techniques or content for future teaching sessions with the same or other patients (Rice, 1983).

Readiness to Learn

As was noted in the previous section, goals for learning may vary among individuals, even when the disease process is the same. This variation can be related to readiness to learn. Readiness to learn has two interrelated facets. One facet is experiential readiness, and the second facet is emotional readiness or motivation.

Experiential readiness. Experiential readiness refers to whether or not patients have had experiences that will prepare them to learn what needs to be learned. Factors which influence this type of readiness are education, socioeconomic status, ability to learn, culture, attitude, physical skills, and age (Redman, 1976).

A patient's educational level and socioeconomic status may provide helpful clues about the health beliefs and behavior of that person. These two factors often relate to vocabulary, and reading and writing ability (Kozier & Erb, 1983). Closely associated with educational level and socioeconomic status is ability to learn. Ability to learn influences patients' capability to learn what they need to know (Narrow, 1979).

One's culture influences experimential readiness to learn. Inherent within a culture are values and values affect attitude toward acceptance or rejection of various health practices. Even if a patient has the readiness to learn a practice contrary to his cultural beliefs, the

long-term result may be noncompliance (Wolff, Weitzel Zornow & Zsohor, 1983).

Experiential readiness to learn a psychomotor skill is affected by one's physical skills. Coordination and dexterity may be important if the skill to be learned requires manipulation of small equipment. Size and strength may play a role in acquiring skills requiring heavy equipment. An adequate sense of sight, hearing, smelling, tasting or feeling may be prerequisites for acquiring many skills (Narrow, 1979).

Age plays a role in experiential readiness to learn. One's age gives information regarding maturational level and the type of learning behavior that can be acquired. The teaching-learning process of children varies greatly from that of adults. Adults have a storehouse of experiences from which to draw. They are relatively more goal-oriented and self-directive than children. They are selective in what they choose to learn. Adults are more likely to learn information relevant to their own present situation. Older adults may have physical or mental deficits that make the teaching-learning process difficult (DuGas, 1983).

Experiences of life are an important aspect of readiness to learn. Experiences determine not only what patients are capable of learning, but also what they choose to learn and implement. Should the teacher determine that a

patient does not have the experiential readiness to learn, either the teaching plan will have to compensate for the deficits or a family member or other person will have to be taught to help the patient to function (Redman, 1976).

Emotional readiness. In addition to experiential readiness to learn, the patient must have emotional readiness or motivation to learn. Emotional readiness or motivation determines the willingness of the patient to put forth the effort necessary to learn. If a patient does not understand an idea, the lack of understanding will contribute to a lack of motivation. A patient may understand an idea, but, if the perception is one of unimportance, the perception of unimportance will contribute to a lack of motivation (Redman, 1976).

On the other hand, a patient may be very motivated to learn. A variety of factors may contribute to motivation. A desire to get well, to manage one's own care, to return to work, or a desire to please others may be factors motivating learning. Although the sources of motivation may be varied, the behavior of motivated learners may be very similar. Behaviors that usually indicate motivation to learn include the patient leaning forward, asking for further explanation, or requesting books or pamphlets (Narrow & Buschle, 1982).

Another factor which influences motivation may be affected by one's physical and emotional status. Patients

must have enough physical energy to be motivated to participate in the teaching-learning process (Narrow, 1979). Patients who are acutely ill are rarely motivated to participate in teaching-learning programs (Wolff, Weitzel, Zornow & Zsohor, 1983). Patients who have been acutely ill may not feel strong enough to particiate. They may tire quickly or have a very short attention span (Kozier & Erb, 1983; Walsh, 1982). Patients who have been acutely ill may have needs more basic than learning, which are motivating their behavior (Potter & Perry, 1985).

Patients must have enough psychological energy to be motivated to participate in the teaching-learning process (Kozier & Erb, 1983). Strong emotions of any kind will decrease one's motivation to learn. Fear, worry, grief, anger, guilt, and anxiety are common emotions experienced by patients that decrease motivation to learn (Narrow, 1979). One's stage of psychosocial adaptation to illness, also affects motivation to learn (Potter and Perry, 1985). In view of the importance of this aspect of motivation, it will be discussed in detail in a later section.

While internal motivation is longer lasting and more self-directive than external motivation, some basic principles of external motivation can be utilized by the teacher to promote learning. Posters, pamphlets and other visual aids in the environment can focus the patient's attention on what needs to be learned. Praise for a healthful change

in behavior may provide the incentive to continue that behavior. The teacher can provide situations in which the patient can be successful, realizing that success is more motivating than failure. Lastly, the teacher can enhance motivation by organizing the material in the way that is most meaningful for the patient (Redman, 1976).

Psychosocial adaptation to illness Illness, with the threat of temporary or permanent loss of health, is difficult for most persons to accept. It precipitates a series of redefinitions of one's self and these redefinitions proceed in identifiable stages (Potter & Perry, 1985). The degree of adaptation required is determined by one's pre-illness self-concept, the severity of the illness, and the changes in life-style necessitated by the illness. Models of psychosocial adaptation to illness reflect the variations in readiness to learn that occur during the process of adapting to illness (Redman, 1976).

Redman (1976) noted that even though the various models of psychosocial adaptation have different names for the stages and a different number of stages in the process of adaptation, conmonalities exist among them. Commonalities include recognizing denial as an initial stage, acceptance as a middle stage, and reorganization as a final stage of adaptation to illness.

During the initial stage of adaptation to illness, denial interferes with learning. Information given about

the diagnosis and treatment plan at this time will need to be reinforced later. During the middle stages of adaptation patients accept their diagnosis. However, they are preoccupied with themselves. This preoccupation interferes with complex learning. Appropriate teaching may include information related to purpose and preparation for diagnostic testing.

During the last stage of adaptation to one's illness, reorganization occurs. The patient deals with his loss and redefines his identity. It is during this stage that patients are ready to learn about self-care. Families and support groups can enhance this process (Redman, 1976).

Lederer (1952) identified three stages of acceptance to illness. The first stage, transition from health to illness, is characterized by apprehension and anxiety. Behaviors reflect denial of the illness state, but by the time that this stage is completed the patient is driven by his symptoms to seek diagnosis and treatment. The second stage is accepted illness. The patient has accepted the diagnosis and early treatment. Dependence and preoccupation with symptoms and illness are characteristic behaviors. This stage ends with reversal or arrest of the pathological process. The third stage, convalescence, is characterized by a restoration of physical strength and pre-illness personality.

Suchman's (1965) model of adaptation consists of five

stages. The first stage, symptom experience, involves physical, cognitive and emotional components, although denial of the symptoms is common. The second stage is assumptiom of the sick role. The patient seeks professional help and permission to assume the sick role from family and friends. The third stage is medical care contact; the patient seeks diagnosis and treatment. During the fourth stage, dependent patient role, patients accept and follow the prescribed treatment regimen. The fifth and last stage is recovery or rehabilitation. The patient role is relinquished and pre-illness relationships are reestablished. For patients with chronic illness this stage is long and demanding with recurring episodes of illness.

Marjorie Crate (1965) developed an adaptation model to chronic illness. In this model adaptation encompasses four stages: (1) disbelief, (2) developing awareness, (3) reorganization of relationships with others, and (4) resolution of the loss and identity change. Nursing behaviors that support adaptation are identified for each stage.

The first stage, disbelief, is an effort to deny the threatening condition in order to protect oneself against the impact. Behaviors demonstrated by the patient include claiming to have some other disease which could cause the symptoms, diverting attention away from the illness or refusing to participate in the treatment. Supportive actions

to be implemented by nurses include being a noncritical listener, accepting the patient's point of view, and avoiding statements of reality. The patient must be confident, however, that the nurse will act in accordance with the reality he cannot as yet accept.

The second adaptation stage is that of developing awareness. The patient becomes aware of the disease process and its implications. Awareness also implies acceptance of care and dependency on others. The patient will express anger and hostility. It may be expressed openly to staff, family members, and others or expressed inwardly as depression. During this stage, the nurse listens to the patient's expression of anger, yet does not argue or defend the criticized person or situation. Administering dependable physical care is important. Presentation of complex medical knowledge is inappropriate.

During the awareness stage, the patient may feel guilty in relationship to his illness. These guilt feelings need to be expressed and again the nurse needs to be a noncritical listener. As awareness increases, the anger becomes directed more toward the fact of being sick. It is at this point that facts about the illness can be heard and one becomes able to participate in self care. The nurse must, however, allow patients to be dependent, as needed, realizing that this behavior indicates increased adaptation to illness.

The third stage of Crate's psychosocial adaptation to chronic illness is reorganization of relationships to others. This stage involves the patient reestablishing a relationship with his family and friends as a person who is sick. The family and friends need to be able to understand his feelings and offer sympathy. The nurse does not need to become the go-between in this process. However, she still needs to be able to listen noncritically to the patient and the family.

The fourth stage is resolution and identity change. During this stage, the patient "begins to acknowledge changes in how he sees himself and he begins to identify with others who have the same problem" (Crate, 1965, p. 75). Patients often speaks derogatorily about themselves. The nurse should realize that this type of verbalization helps alleviate the pain and acknowledge the loss.

As this stage progresses, the patient reaches out to others who have the same problem and decreases his dependency on the nurse. The final aspect of this stage is when one can say, "I have a disease and there are limits to my life because of it" (Crate, 1965, p. 76).

Crate (1965) did not relate the teaching-learning process to each stage of the adaptation model. However, her descriptions of the various stages seem to indicate that complex teaching, such as is associated with chronic congestive heart failure, would be done most effectively in

the last stage of adaptation.

Maureen McHatton (1985) related instruction for a cardiac rehabilitation program to Lee's four stages of emotional adjustment to trauma and Maslow's hierarchy of needs. According to Lee, the first stage of emotional adjustment to trauma is impact, with anxiety being the major symptom. This initial stage of trauma corresponds to Maslow's first two levels of needs, physiological and safety. McHatten (1985) recommended that no teaching be started during this period. Explanation of his environment and of diagnostic test and treatments should be done to aid in dealing with the anxiety.

The second stage of adaptatiom is regression, with denial being the major behavior. The regression stage corresponds with the love and belonging needs of Maslow's motivational theory. Fear of losing the sources for meeting these love and belonging needs causes the patient in the regression stage to angrily lash out at family and staff members. Teaching in the regression stage is done through providing small doses of reality in nonthreatening ways.

The third stage of adaptation is acknowledgment. Coinciding with this stage is Maslow's self-esteem needs. These needs are in jeopardy and the patient makes derogatory remarks about himself. In addition, he may ask questions about the future. It is during this stage of acknowledgment that effective teaching can begin.

The last stage of adaptation is reconstruction. It parallels Maslow's self-actualization level of needs. Hope for the future is evidenced by recognition of the possibility of realizing one's potential even when limitations exist. Rehabilitation training is very helpful at this stage. Alternatives can be presented and new approaches to life can be tried. Teaching that involves change in habits, such as smoking, is done in a non-blaming manner so that the recent recovery of self-worth is not marred.

MacMillan (1981) noted that "patients' reactions to illness include feelings of rage, guilt, depression, regression, resentment, denial, and rejection" (p. 1513). These feelings, she concluded, are barriers to learning and recommended that teaching for each patient includes two levels. The first level should be the discussion phase where "the objective is to build up the patient's psychological resilience by answering questions, discovering fears and doubts, and talking about the future with hopefulness" (p. 1514). The second level of teaching is direct instruction where "the objective is to inculcate the sort of confidence that derives from knowing exactly what to do and why to do it even when medical support is withdrawn" (p. 1514).

Walsh (1982) noted that patients cannot learn when they are anxious about their diagnosis and illness. She suggested that "The stages in acceptance of diagnosis

provide a roadmap for understanding a patient's feelings/ psychological processes and insight into opportunities to intervene with patient education" (p. 84). Her concept of the stages of acceptance of a diagnosis are the same as those identified in patients dealing with death and dying by Kubler-Ross. These stages, in progressive order, are denial, anger, bargaining, depression, and acceptance (Kubler-Ross, 1975). In the bargaining stage, teaching may be begun. The patient is presented with the treatment regimen with emphasis on compliance promoting a healthy productive life. Should this stage be missed, the acceptance stage would then be the appropriate stage to intervene. Walsh (1982) did note that patients may have returned home by the time that the acceptance stage has been reached.

Thus, even when teaching has been done, it cannot be assumed that learning has occured. Evidence that learning has occurred is indicated by changes in behavior (Brunner & Suddarth, 1988). In patient teaching the changes in behavior are directed toward promoting health, preventing illness and coping with illness (Narrow & Buschle, 1982). While patient teaching cannot gurantee follow through behavioral changes that reflect compliance to prescribed regimens, it is an essential component for accomplishing this goal (Redman, 1976).

Compliance

Narrow and Buschle (1987) defined compliance as "behavior of a patient which follows a nursing or medical regimen" (p. 865). The degree to which a patient follows through with his treatment regimen is under the control of the patient himself (Redman, 1976). McCord (1986) noted that "noncompliance with the prescribed treatments can lead to potentially serious complications or even mortality" (p. 2). Young (1986) noted that noncompliance can lead to "chronic poor health and ultimately death" for the individual, and for society, the consequences "may range from loss of productive work time to increased cost of health care" (p. 37).

As already stated, treatment for congestive heart failure is life-long. Most often this disease cannot be cured. However, the symptoms can be controlled (Shamansky, Cecere & Shellenberger, 1984). Brunner and Suddarth (1984) noted that patients with congestive heart failure frequently return to the clinic or hospital for recurring episodes of the same condition. These episodes create psychological, sociological. financial, and physiological burdens. Physiologically, repeated acute episodes of congestive heart failure can lead to fibrosis of the lung, cirrhosis of the liver, enlargement of the spleen and kidneys, and anoxic brain damage. Many acute episodes can be prevented through patients' adherence to their prescribed treatment

regimen (Brunner & Suddarth, 1984).

The degree of difficulty in carrying out a treatment regimen varies among patients (Redman, 1976). Marston (1976) in her review of compliance literature, noted that studies have revealed a noncompliance rate of 4 to 100 percent. She did warn, however, that wide variations existed in the operational definitions of compliance. In addition, truly objective measures of compliance with certain recommendations, such as a special diet, are unavailable.

Various methods have been used to measure compliance, each with strengths and limitations. These methods include "self-reporting, provider reporting, appointment record , results (improvements and complications), physiological assessments of selected parameters, pill counts, and direct observations" (Westfall, 1986, p. 25). Marston (1976) noted that even though the actual physical condition of patients cannot be used as a criterion of compliance, "some investigators speculate that recurrent episodes of illness on the part of patients with chronic disorders may be explained by patient's defections from therapy" (p. 313). In respect to patients' reports of compliance, she concluded that "compliance estimates are probably inflated, except in those cases where the patient has followed little or none of his regimen" (p. 320). Westfall (1986) concured with Marston that compliant behavior tends to be over reported while

noncompliant behavior tends to be underestimated. The self reporting method of assessing compliance does, however, have the strengths of being simple, practical, and generally reasonable to use (Westfall, 1986).

While wide variations seem to exist in the per cent of patients who are compliant and methods used for assessing compliance, variations also seem to exist in factors thought to affect compliance. Demographic data, severity of illness, and complexity of the treatment regimen were reviewed by Marston (1976) in relationship to compliance. Sex, age, race, marital status, socioeconomic status and education had no significant effect on compliance. It was "unclear whether actual severity of illness is related to compliance, although severity, as perceived by the patient probably results in increased compliance" (p. 320). It was also found that noncompliance increases as the complexity of the regimen increases. Marston concluded that, from her review of the literature, "no clear picture emerges concerning the determinants of compliance" (p. 321).

Padrick (1986), through review of the literature, identified five factors which affect compliance. These are "personal factors such as willpower and determination, a positive patient to nurse relationship, success with the regimen, encouragement, and the amount of time and effort required to manage the regimen" (p. 20-21).

Young (1986), however, concurred with Marston noting

that the reasons people are noncompliant with their health care regimen are unclear. He did identify possibilities stating that they "range from forgetting, to lack of knowledge, to feeling better or worse, to getting contradictory advice from family or friends" (Young, 1986, p. 31). Waller and Altshuler (1986) suggested that noncompliance may be related to an unresolved grief reaction. Onset of a chronic disease represents a loss to a person. If feelings of anger, sadness, and guilt associated with these losses are not resolved, acting-out behavior may present as noncompliance with the medical regimen.

Various strategies have been used to improve compliance. One group of strategies include organizational aspects associated with the delivery of health care. These strategies involve convenient appointment times, prompt service, telephoned or mailed appointment reminders, and increased frequency of appointments when initiating or changing the treatment regimen. Also included in the organizational aspects was patient involvement in planning the treatment regimen which promoted individualized convenience, simplicity, economy, and realistic expectations of results (Young, 1986). For example, when the medication regimen is individualized for a patient, consideration is given to physical conditions such as sight, muscle control, and ability to swallow. If the patient is unable to read, color coded caps on the medication bottles may be used. If

forgetfulness is a problem, an alarm clock or other reminder may be helpful. Transportation to obtain medications and ability to pay for them are also important considerations. (Hill, 1986).

A second set of strategies to improve compliance encompasses education of the patient in relationship to the disease process and the treatment regimen. Assessing the patient to determine what he knows, as well as what he thinks he needs to know is critical. Evaluation followed by reinforcement of unclear or unlearned information completes the educational process. However, Young (1986) emphasized that education is only one aspect of a total plan to promote compliance with long term treatment regimens. Hill (1986), in relationship to drug compliance, concurred with Young (1986) noting that a far greater nursing challenge than teaching accurate information is "to motivate the patient to participate in his own treatment; to see himself as the most important member of the health care team" (p. 50).

Thus, a third set of strategies are behavorial techniques aimed at initiating and fostering compliant behavior. When a health care regimen is first started, the results of feeling better may be an adequate reward to promote compliance. When the regimen has to be maintained for a chronic condition, other types of reinforcement may be needed. Contracting and self monitoring accompanied by

a cooperative, non-authoritative relationship with a health professional may help to promote long term compliance (Young, 1986). Bennett (1986) concurred, stressing the importance of the effective use of communication and negotiation skills by the health care worker.

Techniques for promoting compliance need to be individualized. "All have been demonstrated to increase compliance in some people and all have been shown to have no effect in other people" (Young, 1986, p. 36). Baer (1986) noted that nursing has four unique qualities which are conducive to therapeutic interventions for promoting compliance. One unique quality is that traditionally the focus of nursing has been holistic. Holism, the integration of mind and body, is the human response required to promote, maintain, or restore health. This focus is also congruent with patient education which provides the bases for informed decision-making and needed life-style changes. Holism also involves activating the patient's support system, a well established role of nursing, and a factor significant to compliance.

A second unique quality of nursing which makes it conducive to therapeutic interventions for promoting compliance is the number of nurses. Since nurses compose the largest segment of health care professionals, patients have the possibility of more contact with nurses than doctors, social workers or any other health professional.

Thirdly, nursing uses the nursing process as a framework for providing care. To review, the components of this process are assessment, analysis, planning, implementation, and evaluation. Each component mandates interaction between the patient and nurse. The importance of these interactions is especially critical given the fact that the patient ultimately controls compliance.

The fourth unique quality of nursing which makes it conducive to therapeutic interventions for promoting compliance is accountability. Nurses have had long term experience at being accountable to patients, employers, physicians, the profession and the public. With the health care consumers demanding accountability, nurses can utilize their experiences to yield positive compliance results (Baer, 1986).

Efficacy of Health Education for Patients with Chronic Congestive Heart Failure

In congestive heart failure, the progress of the disease depends to a great degree on the patient's ability and willingness to follow a prudent health management plan. Many patients in the early stages of the disease do not have the management information they need to prevent severe and rapid deterioration. Thus they must learn what is required for controlling the progression of the disease.

In their study, Cable and Mayers (1983) examined the effect of implementing a discharge planning program for

patients with congestive heart failure as well as for patients with other diagnoses. Discharge planning involved making arrangements for continuity of care from the hospital to home or from hospital to extended care facility. Patient education was an integral part of the discharge planning process.

These researchers (Cable & Mayers, 1983) examined the length of hospital stay for patients who received discharge planning in three Pennsylvania community hospitals. The findings were compared to the annual median length of stay by diagnosis for two years before, to two years after the introduction of discharge planning. Congestive heart failure, cerebrovascular accidents, chronic obstructive pulmonary disease and fractured hips were diagnoses studied. The control diagnoses were either cataract surgery or benign prostatic hypertrophy. Changes in length of hospital stay which could be attributed to discharge planning were identified by established criteria.

Results indicated that with the onset of discharge planning, the length of stay increased for some diagnoses and decreased for others. In addition, inconsistency of effect among the hospitals was revealed. However, "the length of stay of congestive heart failure patients appears to have increased in nearly every instance" (Cable & Mayers, 1983, p. 59). The authors noted that "while congestive heart failure patients may stay in the hospital

longer with discharge planning than without, the quality of their aftercare plans may eliminate their need to return to the hospital" (Cable & Mayers, 1983, p. 59). Rehospitalization, however, was not investigated in this study.

The difficulty in providing adequate discharge planning was experienced by the staff members at Columbia Presbyterian Medical Center in New York. They were discouraged and frustrated by the frequent rehospitalizations of discharged patients for the same problems. A round-table presentation of the solution which was developed to improve discharge planning revealed a multidisciplinary program called METHOD. Each letter of METHOD represented an area of consideration for discharge planning. M represents medications; E, environment; T, treatment; H, health teaching; O, outpatient referral; and D, diet. Although no formal quantitative data was included in the article, Ruth Huey, one of the round-table participants, stated that the results of using this technique included "...a smoother transition between hospital and home and a reduction in repeated hospitalization for patients with chronic illnesses (Loomis et al., 1981, p. 70).

Lewis (1978) described the care of patients with congestive heart failure as a three ring circuit. One circuit involved the hospitalization required when congestive heart failure is at its most severe stage. A second circuit involved follow-up care in the ambulatory setting aimed at

control of the disease and prevention of recurrences necessitating rehospitalization. The third circuit involved the patients themselves, who must comply with the treatment regimen and monitor their health status. Should either the ambulatory health provider or the patient inadequately monitor the disease status, "the circuit will be closed by the need for repeated hospitalization" (p. 12).

Lewis (1978) further reported the results of an audit on congestive heart failure that he conducted at a Northeastern community hospital. The audit focused on 15 patients who had repeated admissions for congestive heart failure. Each of the 15 patients had been hospitalized at least two times during the six months prior to the audit, with a total of 50 admissions among them. Eleven of the 15 patients were 70 years old or older.

The audit attempted to determine the circuit contributing to rehospitalization and to identify areas of noncompliance to predetermined criteria related to the care of patients with congestive heart failure. Areas of deficit for hospitalization included lack of a daily weight record during hospitalization and failure to instruct patients to weigh daily after discharge. In addition, one patient with three admissions was found to have been discharged each time before the disease process was stabilized. Review of records in the ambulatory setting revealed a lack of notes about health status, medication

compliance and diet compliance. Thus the audit committee was unable to adequately assess the second circuit (follow-up care), and the third circuit (patient involvement).

As a result of the audit, three changes were made to improve care of patients with congestive heart failure. One change was that daily weights were instituted as part of the routine care of patients hospitalized with a diagnosis of congestive heart failure. A second change involved the development of forms for the ambulatory care settings to promote adequate patient assessment. The third change was initiation of a patient education program in the hospital setting. In the educational program, the importance of a low salt diet and daily weights was stressed. Information about medication, warning symptoms that should be reported to the physician, and follow-up care were also included. The author noted that"...in some cases prompt ambulatory care and adequate self care might prevent repeated hospitalization" (Loomis, 1978, p. 14).

Perlman, Isenberg, Donnovan, Fleming and Hammarstein (1969), in their case histories of five patients with congestive heart failure, described the services of the public health nurse in the care of these patients. The services included patient teaching, counseling, alteration in living arrangements, detection of early signs of cardiac failure, and follow-up of medical regimen. The authors noted that "These case reports indicate that, in selected

instances, periodic home nursing visits may have a dramatic effect on the course of an individual's illness" (p. 89).

Hulka, Cassel, Kupper and Burdette (1976) studied the effect of medication regimen and doctor-patient communication, on the medication-taking behavior of 357 patients with diabetes mellitus or congestive heart failure. In addition, physician awareness of the patient's medication-taking behavior was assessed. Medication-taking behavior focused on errors of omission and commission, scheduling misconceptions, and scheduling noncompliance.

Within two weeks after having been seen at the office of the physician, patients were visited by a nurse interviewer. The patients displayed their current medications, indicated the function of each medication, repeated the physician's scheduling recommendations, and indicated their compliance to the schedule. These data were compared to the physician's prescriptions as noted on the patient's medical record.

The physician's success in communicating the treatment regimen was determined by comparing the patient's knowledge to the physician's indication that instruction had been given. The success of communication was determined separately for patients with congestive heart failure and patients with diabetes. Results showed that the average patient error for both groups of patients was omission of 18-19 percent of the prescribed drugs, taking 19-20 percent

more drugs than the physician realized, making errors in the scheduling of 17 percent of the drugs, and being non-compliant in scheduling of 3 percent of drugs.

Four categories of variables were examined for a relationship to the drug error rate. One category was patient characteristics which consisted of age, sex, marital status, education, current activity, number of people in the household, and social class. No statistically significant relationship was found between any of these variables and error rates.

A second category of variables was disease severity which included the duration of diabetes or congestive heart failure and the number of their concurrent diseases. No statistically significant relationships were found between either of these two factors and drug error rates.

A third category of variables was medication regimen which included number of drugs involved, knowledge of drug function and complexity of medication schedule. The number of drugs involved showed a statistically significant relationship to drug errors. Errors of omission and commission increased proportionately with number of drugs prescribed and consumed, while errors of scheduling misconceptions occurred regardless of the number of drugs involved.

Knowledge of drug function affected error rates. Lack of knowledge of the function of all medications showed a statistically significant relationship to errors of

commission and errors related to scheduling miscoceptions, regardless of the number of medications involved. Errors of omission were not associated with knowledge of drug function.

Complexity of medication schedule affected error rates. For the study subjects, it was easier to remember the schedule for taking medications once a day than to remember the schedule for taking medications more frequently. A statistically significant relationship was found between errors related to scheduling misconceptions and complexity of medication schedule.

The fourth category of variables related to drug error rates was doctor-patient communication. No association was found between doctor-patient communication and drug error rate for diabetic patients. However, for congestive heart failure patients, a statistically significant relationship was found between decreased level of communication and drug error rate. The relationship was significant for errors of omission, commission, and scheduling misconceptions.

The authors noted that "written instructions or an additional provider to insure comprehension of the information transmitted" (p. 853) may be needed. They also noted that the consequences of inappropriate drug use are "inadequate control of the disease process as well as excess morbidity attributable to the drugs themselves" (p. 847).

The study conducted by Regner, Hermann, and Reid (1987)

supported the conclusion of Hulka, Cassel, Kupper, and Burdette regarding written patient instructions. Regner, Hermann & Reid (1987) conducted a study to determine which of three different methods was most effective in teaching information about the drug, digoxin. The methods of teaching were (1) a printed leaflet, (2) a printed leaflet and verbal consultation, or (3) verbal consultation only. The effectiveness of each method was determined by the ability of patients to make appropriate decisions related to side effect symptoms of digoxin. Results indicated that the group receiving the combination of a printed leaflet and verbal consultation had a significantly greater number of correct responses for the simulated case than did the other two groups. The authors concluded that "Health care practitioners should consider the use of printed drug information materials as essential components of programs aimed at enabling patients to respond appropriately to unwanted effects that occur during drug therapy" (p. 203).

Soflin, Young and Clayton (1977) studied the effect of an individualized patient education program about digoxin and congestive heart failure on patient learning. The purpose of the study was to determine whether patients who received the individualized educational program from a pharmacist would demonstrate a significantly greater gain in knowledge than patients who received traditional education. The traditionally educated patient was defined

as "a hospitalized patient who was exposed to the routine health care education provided by all personnel involved in his health care" (p. 368).

To obtain subjects for the study, charts on the medicine units of two separate institutions were reviewed for meeting the following criteria:

1. Patient must be at least 20 years of age,
2. Patient must be on oral digoxin therapy,
3. Patient's hospitalization must provide an adequate period of time for study procedure,
4. Patient must be capable of adequate verbal communication and visualization, and
5. Patient's physician must be aware of patient's participation in the study (Soflin, Young, & Clayton, 1977, pp. 368-369).

If the patient met the first four criteria, the patients' physicians were contacted concerning their inclusion in the study. Each selected patient was then randomly assigned to either the control group or study group by the flip of a coin. Eight patients composed the control group, seven patients, the study group.

Each patient in the study was given a pre-test and each patient received the traditional education. In addition, the study group received the individualized slide/tape audiovisual presentation about digoxin and congestive heart failure with a pharmacist available to answer questions. A post-test which had content identical to the pre-test was given to patients in both the control and study groups.

No significant difference was found between the means of the pretest for the two groups. However, the study group

scored significantly higher than the control group on the post-test. The authors note that even though the effect of patient education on compliance, reduction of drug-induced complications and reduction in rehospitalization was not evaluated, studies cited in the article "substantiate the assumption that drug and disease-oriented education programs for patients positively influence compliance and patient understanding" (p. 369).

Marsh and Perlman (1972) studied compliance of patients with congestive heart failure to taking digoxin. They randomly selected sixty congestive heart failure patients from the outpatient medical clinic at Milwaukee County Hospital to study the relationship between understanding the disease and taking digoxin regularly. They reiterated that failure to take the prescribed medication might lead to repeated hospitalizations, increased discomfort, and increased expenses for the patient. Data were obtained through patient interview.

Results of the study showed that 33 of the 60 patients took their medication as prescribed; 26 of the 60 patients understood congestive heart failure. While age, sex or race had no direct relationship to understanding, a significantly greater number of patients who had an eighth grade education or better understood, than patients who had less education. The patients who understood their disease had been diagnosed for a longer period of time and had fewer

hospitalizations per year, per patient, than patients who did not understand. Patients who did not understand, took digoxin less frequently. The authors concluded that "lack of understanding is significantly correlated with failure to take medications and with an increased rate of hospitalization" (p. 70).

Romm, Hulka and Mayo (1976) related components of care for a six month period to patient outcomes, for 122 adults who were being treated for congestive heart failure. Components of care included patient characteristics, degree of initial morbidity and process of care. The hypothesis was "that the most signficant relationship to outcome, as measured by activity and symptomatology, is the patient's initial status with regard to these measures; in other words, care process has a minimal relationship to the patient's disease outcome" (p. 766).

As part of the study, patient characteristics for age, race, sex, marital status, occupation and education were obtained. The number of years since diagnosis, previous hospitalization for congestive heart failure, underlying cardiovascular conditions, other medical problems, current medications, and most severe limitation graded according to the New York Heart Associations (NYHA) functional scale, were used to indicate degree of initial morbidity.

Process of care involved several variables. One variable was physician awareness of patient problems. The

second was communication which indicated the patient's demonstrated knowledge of the treatment regimen communicated to the patient by the physician. The third variable was drug error. The fourth was management which compared the care received by patients to predetermined criteria. The fifth variable was patient satisfaction with the medical care received. The last variable for process of care was utilization of services, which reflected the number of chest x-rays, blood studies, doctors visits and hospitalizations related to congestive heart failure.

Patient outcome, as indicated in the hypotheses, was measured by activity and symptomatology. To determine the activity status, 11 activities of daily living with varying energy requirements were evaluated according to the patient's ability to perform them at a normal pace, a slower pace than most people, or not at all. Symptomatology was based on patients' responses to questions about fatigue, edema, dyspnea on exertion, and orthopnea or paroxysmal nocturnal dyspnea. Activity status and symptomatology were determined at the beginning and end of the six month period.

All of the variables were quantified. Correlation and regression analysis revealed that the "largest and most significant predictors of outcome status were measures of initial disease status" (p. 765). Only in a group of patients who had minimal symptoms initially were process variables strongly and significantly related to outcome.

The authors did note that one of several questions related to this study might focus on the ultimate downhill course of patients with congestive heart failure.

Variables that were significantly related to the outcome of activity were social class, hospitalizations, NYHA classification, initial activity, initial symptoms, physician awareness of patient's problems, patient satisfaction, utilization of services and final symptoms. Variables that were significantly related to the outcome of final symptoms were education, social class, NYHA classification, underlying cardiovascular conditions, initial activity, initial symptoms, physician awareness of patients' problems, management regimen, patient satisfaction and final activity. None of the remaining variables studied had a relationship to the outcome variable at the .05 level of significance or greater.

Gibson (1966) described a study involving 180 indigent patients with congestive heart failure in Dade County, Florida. The patients were equally divided into study and comparison groups. Both groups continued to receive routine clinic care. However, the study group was visited monthly by a public health nurse who "reviewed the signs and symptoms of heart failure, drug therapy, diet and social problems, and reported her findings to the physician in charge of the project who took appropriate action" (p. 145). All patients were followed for 13 months, and at the

end of this time, days of rehospitalization were determined for each group.

The data showed that, for cardiac causes, the study group rate per 1,000 patient days at risk was 14.3, while the comparison group rate per 1,000 patient days at risk was 26.2. In addition, for other than cardiac causes, the study group rate was 9.1 per 1,000 patient days at risk and the comparison group rate was 15.3 per 1,000 patient days at risk. The results demonstrate the significance of regular continuing care for patients with congestive heart failure in relationship to rehospitalization.

Farag and Mozar (1967) described the effect on rehospitalization of a one year intensive home visitation program for patients with congestive heart failure. The patients included in the study had to be less than 75 years old and have a congestive heart failure functional classification of Class I, II, or III. No rationale was given for excluding patients over 75 years of age. The reason given for excluding Class IV patients was that their "advanced condition made them unsuitable candidates for instruction" (p. 26). Only 155 of the 356 patients who were referred were eligible for the study. The eligible patients were randomly assigned to the study or control group. Both groups received regular care from their physicians. Each patient in the study group received, in addition, a total of 30 visits from a health educator,

nurse and/or nutritionist.

Results of the year long study revealed that only 8 of the 69 study group patients required hospitalization while 28 of the 66 control group patients required hospitalization for treatment of congestive heart failure. Hospitalization for conditions other than congestive heart failure was comparable for the two groups. The study group had a combined total of 23 days of hospitalization for congestive heart failure while the control group had a combined total of 212 days.

Hanchett and Torrens (1967) described the effect on hospital admission rate of adding public health nursing follow-up to the routine outpatient clinic care of patients with congestive heart failure at St. Luke's Hospital Center in New York. Two hundred and thirty-nine patients were randomly assigned to either the study or control group. The study group received home visits between clinic visits, as well as communication by telephone. After two and one-half years, rate of hospital admission was determined for each group.

Results showed that the hospital readmission rate for cardiac diagnosis was approximately the same for the study group and the control group. The hospital readmission rate for congestive heart failure was significantly less for the study group than for the control group. In addition, the number of days of hospitalization for the study group was

approximately one-half of the number of hospitalization days of the control group for congestive heart failure. The lower rate of admission and lower number of days of hospitalization for the study group in comparison to the control group suggested that signs of deterioration were detected earlier for the study group through home visits. It is relevant to note that the largest segment of nursing time was spent in patient educaton and motivation to promote compliance with the treatment regimen. The home health nurses used the telephone for communication in addition to home visits.

Conceptual Framework

The conceptual framework for this study is a combination of Crate's (1965) psychosocial model of adaptation to chronic disease and Maslow's (1970) theory of motivation. To review, the stages of Crate's model of adaptation are (1) disbelief, (2) developing awareness, (3) reorganization of relationships with others, and (4) resolution of the loss and identity change. The hierarchy of needs listed in ascending order, that form the basis for Maslow's theory of motivation are (1) physiological needs, (2) safety needs, (3) belongingness and love needs, (4) esteen needs, and (5) the need for self actualization. Crate's stages of adaptation as related to Maslow's motivational needs, has implications for emotional readiness to learn.

In attempting to apply this framework to the teaching of patients with congestive heart failure, it would seem that during the state of disbelief, when patients are denying their diagnosis, they are being motivated by physiological and safety needs. During this stage, the patient is usually acutely ill. Teaching should be concerned with the events of the day. Explanations of diagnostic tests and information pertaining to the present treatment regimen are appropriate content.

As the patients progress to the stage of developing awareness, they are being motivated by belongingness and love needs. They explore the implications that the disease process will have on themselves and their significant others. Teaching at this stage should be an introduction to the physical changes caused by the disease and the life-style changes required to compensate for them. This content is often given in response to patient questions. As learning occurs, it is often shared with significant others to test their reaction to the situation. Depression and open hostility may be behavioral reactions during this stage.

Crate's (1965) third stage of adaptation is reorganization of relationships with others. The motivator during this stage is esteem needs. Patients establish relationships with significant others as sick persons. They need to be taught the nature of the disease process. The depth

of the content that is taught depends on the extent that one can and desires to understand it. This understanding provides the rationale for the treatment regimen and the needed life-style changes. Information related to these two areas needs to be individualized for the patient.

The fourth stage of Crate's adaptation to chronic illness model is resolution of the loss and identity change. This stage coincides with Maslow's self actualization needs. During this stage, one accepts the fact that he has the disease as well as the limitations imposed by it. With self-actualization needs being the motivator, the goal is incorporation of the limitations into a productive life-style. Teaching centers on reinforcement of the knowledge taught in the reorganization stage and suggestions for its practical applications.

For most patients, the adaptation stage is reached after hospitalization. As a result patients do not gain the depth of knowledge needed for integration of content into their life-styles. Fox (1986) noted that "many hours of teaching are wasted because patients are not emotionally prepared to receive the information" (p. 238). In this study, visits were made in the home after hospitalization to insure that the patients were most likely to be at the stage of adaptation, which was also most conducive to learning.

Definition of Terms

Care Giver - a person who assisted the subjects with any aspect of health care.

Compliance - the degree to which the behavior of a patient with congestive heart failure followed the prescribed treatment regimen. Operationally, it was the score obtained from the Compliance Assessment Guide

Congestive heart failure - "the condition in which an abnormality of cardiac function is responsible for the inability of the heart to pump blood at a rate commensurate with the requirements of the metabolizing tissues or can do so only from an abnormally elevated filling pressure" (Braunwald, 1987, p. 902). Operationally congestive heart failure was the diagnosis by a physician of congestive heart failure.

Days of rehospitalization - days spent in a hospital during the six-month study period.

Discharge planning - making arrangements for continuity of care from hospital to home or extended care facility (Cable & Mayeres, 1985).

Home health care - delivery of prescribed health care in the home.

Hospital readmissions - Number of times a patient is admitted to a hospital during the six-month study period.

Individualized teaching care plan - a teaching care plan

that was composed of the specific treatment regimen prescribed by the physician and the general regimen needed by all patients with congestive heart failure.

Initial hospitalization - admission during the study period with a diagnosis of congestive heart failure when subjects were being solicited for the study.

Patient education - individualized instruction covering general knowledge about congestive heart failure and specific knowledge regarding the plan of treatment.

Psychosocial adaptation - a series of redefinitions of the self that allows a person to adapt to being sick (Potter & Perry, 1985).

Receptivity - degree of acceptance of home health teaching as indicated by the score on the Investigator Receptivity Tool.

Traditionally educated patient - a hospitalized patient who was exposed to the "routine health care education provided by all personnel involved in his health care" (Soflin, Young & Clayton, 1977, p. 368).

CHAPTER III

METHODOLOGY

Design

An experimental design was used to study the effect of patient teaching in the home setting on the number of hospital readmissions, the number of days of rehospitalization, and compliance to the treatment regimen for patients with congestive heart failure. Subjects were randomly assigned to either the experimental group or control group. Both groups received traditional education in the hospital setting.

Both groups also received home visits. The experimental group received a home health teaching program of approximately one hour. The home health teaching program was an individualized program consisting of the following eight content areas: (1) explanation of the pathophysiology of congestive heart failure, (2) function, dosage, frequency, side effects, and techniques for promoting compliance with prescribed medications, (3) prescribed diet, (4) prescribed activity and rest, (5) methods for monitoring the disease process, (6) warning signs of decompensation, (7) follow-up care, and (8) relationship of acute illnesses to chronic congestive heart failure. The control group received an assessment visit of approximately 15 minutes

for the purpose of counteracting the Hawthorne effect. The assessment visit consisted of the blood pressure and pulse being taken, and the feet being checked for edema. Data were collected from both groups by telephone in three months and in six months after the initial hospitalization.

An experimental research design was used so that causal inferences could be made about the relationship between independent and dependent variables. Six distinguishing characteristics of experimental research as identified by McMillan and Schumacher (1984) are as follows:

1. Statistical equivalence of subjects in different groups, usually achieved by random assignment of subjects;
2. Comparison of two or more groups or sets of conditions;
3. Direct manipulation of at least one independent variable;
4. Measurement of each dependent variable;
5. Use of inferential statistics; and
6. A design that provides maximum control of extraneous variables (p. 203)

The major strength of the experimental design is the internal validity obtained through control of extraneous variables and manipulation of the independent variables. The major weakness is external validity, that is, the generalizability of the conclusions to populations and environments beyond the experiment. The more control that is exerted over the extraneous variables, the less generalizable are the conclusions (McMillan and Schumacher 1984).

Population and Sample Selection

Permission to conduct the study in a 400 bed urban hospital located in southeast Virginia was obtained from the Executive Director, through the Director of the School of Nursing in that facility (Appendix A). The subjects were patients admitted to the hospital with a specific diagnosis of congestive heart failure. Physicians admitting patients to the hospital with a diagnosis of congestive failure were contacted by the investigator and permission to ask their patients to participate in the study was obtained (Appendix B).

Each day a Diagnosis Report for congestive heart failure was obtained from the admissions department of the hospital by the investigator. This report listed all patients in the hospital who had been admitted with a diagnosis of congestive heart failure. Patients with this diagnosis who met the following criteria were included in the study:

1. Upon discharge, went home rather than to another health care facility,
2. Were not referred to a home health agency for follow-up care,
3. Were alert and displayed no evidence of severe confusion or other mental aberration,
4. Agreed to participate in the study,

5. Whose physician expressed willingness to have them solicited for inclusion in the study.

Patients who met the criteria for inclusion in the study were visited by the investigator to request that an informed consent form be signed (Appendix C).

Patients who consented to participate in the study were randomly assigned to either the experimental group or the control group in the following manner. The first six patients who were discharged each of the first seven weeks of the study were assigned to the experimental group. Additional patients discharged during each of these seven weeks were assigned to the control group. Beginning with week eight, all discharged patients who consented to participate in the study were assigned to the control group until the number of patients in the control group equaled the number in the experimental group.

Instructors for Home Teaching Program

The instructors in the home teaching program for the subjects in the experimental group were senior nursing students. These students were enrolled in a three year diploma school of professional nursing accredited by the National League for Nursing. They had completed the first and second curriculum level courses and were enrolled in the first course of the third, and last, level courses.

Of particular importance to this study were the

qualifications of these students to teach patients with congestive heart failure. Patient teaching is a nursing function that is taught and practiced from the first course of the first level to graduation. Patient teaching is begun in the curriculum with an introduction to the principles of patient teaching. As various pathological processes, including congestive heart failure, are taught in the curriculum, patient education is included as a component of care. Patient education theory is applied in the clinical setting in the form of patient teaching. Patient teaching, as well as other nursing functions implemented by nursing students, is supervised by an instructor.

All students who developed and implemented the teaching plans for the experimental group in this study had completed the minimal objectives for the courses in the first and second levels of the curriculum. Even though each subject in the experimental group was visited and taught by a different senior nursing student, the fact that all students had participated in similar classroom and clinical experiences gives considerable consistency to the teaching program.

The students who were home visit instructors for the subjects in the experimental group were enrolled in the course Management of Patient Care. They received credit for implementing the home teaching program, as well as

transportation to the subject's home. No remuneration, however, was made to the students who participated in the study.

Home Visits for the Experimental Group

An individualized nursing care plan was developed for each patient using the following content guideline and teaching objectives:

I. Pathophysiology
   A. Explains the function of the heart as a pump.
   B. Explains the pathophysiology of congestive heart failure as an inadequate pump.
   C. Relates inadequate pump function to the symptoms of fatigue, edema, shortness of breath, and weight gain.

II. Medications
   A. Discusses function of each prescribed medication in relationship to congestive heart failure.
   B. Reviews prescribed dosage and frequency for each medication.
   C. Presents major side effects of each medication with methods of detection.
   D. Demonstrates check-off systems for assurance that medications have been taken.

III. Diet
   A. Uses the patient's written diet plan as a guide for

identifying permitted and restricted foods.

B. Discusses examining labels for sodium content.

C. Discusses omitting salt.

D. Discusses salt substitutes and spice shakers.

E. Discusses avoiding excessive eating and drinking.

IV. Activity and rest

A. Reviews activity program.

B. Discusses the need to increase walking and other activities gradually to prevent fatigue and dyspnea.

C. Discusses stabilization of activity at level that produces no symptoms.

D. Stresses need for regular daily rest periods.

E. Stresses need to avoid emotional upsets.

F. Stresses need to avoid extremes of heat and cold.

V. Monitoring disease

A. Stresses the need to

1. Take pulse daily.

2. Weigh daily at same time of day.

3. Observe for fluid retention.

B. Observes for reoccurence of symptoms experienced when illness began.

VI. Warning signs of decompensation

A. Discusses symptoms which should be reported to physician promptly:

1. Pulse less than 60 or greater than 100 beats per

minute at rest.

2. Sudden weight gain of two to three pounds in one or two days.
3. Shortness of breath with usual activity.
4. Shortness of breath at night.
5. Swelling of ankles, feet or abdomen.
6. Persistent cough.
7. Frequent voiding at night.
8. Fatigue or general slowing down in ability to perform daily work.

B. Discusses prompt reporting of the reoccurence of symptoms experienced when illness began.

VII. Follow-up care

A. Discusses the need to keep regular appointments with physician.

B. Discusses the relationship between repeated acute episodes of congestive heart failure and progression of the disease process.

VIII. Relationship of acute illnesses to chronic congestive heart failure

A. Discusses the need to avoid persons with infections.

B. Discusses the need to seek early medical care for acute illness such as influenza and respiratory infections.

C. Discusses the fact that additional illnesses add

an additional workload for the heart.

D. Discusses the risks of across-the-counter medications.

E. Discusses the need to examine medication labels to determine salt content.

The individualized teaching care plan was based on the nursing process format. The steps in this process allow for assessment of the patient's learning needs, planning that incorporates the specific treatment regimen prescribed by the physician as well as the general care needed by all patients who have congestive heart failure, goals that identify patient outcomes and can be used for evaluation, and implementation utilizing the appropriate teaching methods. Teaching aids and depth of content were tailored to the patient's intellectual and educational level. Implementation on an individual basis allowed constant feedback and evaluation of the patient's and care giver's comprehension of the content.

The type of learning for this teaching care plan was largely cognitive learning. The exception was checking to make sure that the patient knew how to take his pulse, which was psychomotor learning. The teaching method for the cognitive learning was discussion with the use of visual aids that could be left with the patient. Visual aids were required for the content areas of pathophysiology, medications, and diet. The method used for the

psychomotor learning was demonstration with return demonstration of how to take the pulse, accompanied by discussion.

The home visit was made within one week after discharge from the hospital. This timing increased the possibility that the subject would have reached the stage of psychosocial adaptation most conducive to learning. Teaching in the home setting at a time confirmed by the subject as being convenient provided an appropriate learning environment.

Home Visits for the Control Group

A home visit within seven days of hospital discharge was made to each subject in the control group by the investigator. The purpose of the visit was to reduce the "halo", "Hawthorne", or "placebo" effect on evaluation of the experimental treatment, the home teaching programs. This effect implies that the conditions which surround an experiment tend to distort the results (McMillan & Schmacher, 1982).

The nursing functions performed during the home visit for the control group included taking the blood pressure and pulse and checking the feet for edema. Conversation during the visits was related to how the subjects were feeling. No mention was made regarding the subjects' treatment regimen.

Instrumentation

An Initial Assessment Guide (IAG) (Appendix D) was used to obtain demographic data and initial morbidity data. Variables for this guide were selected from the study by Romm, Hulka and Mayo (1976), "Correlates of Outcomes in Patients with Congestive Heart Failure." This thorough descriptive study encompassed most of the variables included in other studies related to congestive heart failure. An Interviewer Instructions Guide was developed for the IAG to promote consistency among the interviewers and among interviews (Appendix E).

The Compliance Assessment Guide (CAG) (Appendix F) was used to collect data concerning adherence to the treatment regimen, number of hospital readmissions, and days of hospitalization during the study period. The compliance portion reflects the content areas of the teaching plan. The content areas were developed utilizing the recommendations for teaching outcomes proposed by Tucker et al. (1984) and recommendations for content areas proposed by Waxler (1976) and Reggie (1980). An Interviewer Instruction Guide was developed for the CAG to promote consistency among interviews (Appendix G).

Since no instrument for receptivity to teaching could be found, four professors of nursing and one professor of education suggested behaviors indicating receptivity to teaching. Their suggestions were used as variables in the

Investigator's Receptivity Tool (RCT) (Appendix H). This instrument was used to collect data regarding the patient's and care givers's receptivity to the home teaching.

Description of Procedure

An alphabetical list of the names of all participating nursing students was prepared and numbered, beginning with one for the first name on the list and continuing to 36, the number of students enrolled in the course, Management of Patient Care. Six students each week (two each on Tuesday, Wednesday, and Thursday) for six week, were assigned to the principal investigator by the coordinator of the nursing course. Patients with congestive heart failure who consented to be in the study and were discharged during the first six weeks of the study, were assigned to either the experimental or control group. Patients in the experimental group were assigned to a student nurse. The first patient to be discharged on Tuesday of each week was assigned to the student nurse with the lowest number in the student alphabetical listing. The patient discharged second in order was assigned to the student nurse with the next lowest number on the alphabetical list and so forth. The student nurse was responsible for interviewing the patient prior to discharge from the hospital for the purpose of obtaining demographic data, establishing initial morbidity status and assessing

the patient's learning needs. The patient's medical records were used for verification of the data.

At the time of the initial interview, each individual nursing student made arrangements for the home visit with their assigned patient. Hospital discharge plans for all patients in the experimental group were reviewed by the investigator and the senior nursing students to obtain the prescribed home treatment regimen. An individualized teaching plan for patients in the experimental group was prepared by the assigned student nurse utilizing the Content Guide (Appendix H) prepared by the investigator. The nursing process was the format used in the preparation, delivery, and evaluation of the teaching plan. The investigator reviewed with each student nurse the appropriateness and adequacy of the individualized nursing care plan for the assigned patient.

The day before each home visit a telephone call was made by the investigator to confirm the appointment. A home visit of approximately one hour was made within seven days after discharge and the nursing student implemented the teaching plan for the patient and his or her care givers. The investigator accompanied the nursing students on each home visit. She observed the nursing students to insure that they adhered to the teaching plan. She observed the patient and care givers for receptivity to the teaching. Level of receptivity was documented on the RCT

by the investigator.

Beginning with week eight of the study, all patients who consented to be in the study were assigned to the control group until the number of patients in the control group equaled the number in the experimental group. Prior to discharge, all patients in the control group were interviewed by the investigator to obtain demographic data and establish initial morbidity status. The patient's medical records were used for verification of the data.

Prior to discharge, all patients in the control group were interviewed by the investigator to obtain demographic data and establish initial morbidity status. The patient's medical records were used for verification of the data. At the time of the interview, the investigator made arrangements for a home visit to assess the patient's physical status. Hospital discharge plans for all patients in the control group were reviewed by the investigator to obtain the prescribed home treatment regimen. On the day prior to the home visit, a telephone call was made by the investigator to confirm the appointment. A home visit of approximately 15 minutes was made for each patient in the control group. During the visit the blood pressure and pulse were taken and edema of the feet was noted.

Both experimental and control group patients who required hospital readmission for congestive heart failure during the six-month study period were interviewed by the

investigator during the hospitalization regarding compliance to the treatment regimen. Within one week of the three month and six month anniversary following discharge from the initial hospitalization, all patients in the experimental and control groups were interviewed by the investigator via telephone regarding compliance to the treatment regimen, number of hospital readmissions, and days of hospitalization during the study period. The investigator completed the CAG form during the interview. Patients' hospital records were used to verify the data.

Limitations

The limitations of this study include threats to external validity. Results of the study cannot be generalized to other populations. The population for this study consisted of patients with congestive heart failure who were hospitalized in a 400 bed urban facility located in southeast Virginia. Patients with congestive heart failure who live in a different location may not have responded in the same manner to the experimental treatment and thus different conclusions could have resulted. Generalizability is also limited by the operational definitions of the variables.

Some threats to internal validity could have occurred with this study, but, efforts were made to control these threats. Historical events occuring prior to the beginning

of the study could have influenced the results of the study. Of particular significance is previous hospitalizations. Being hospitalized previously for congestive heart failure would have given the patient the opportunity to have participated in the traditional education that occurs in the hospital setting. Historical events occuring during the study period could have influenced results of the study. With two groups, however, both groups should have been influenced equally. The instrumentation threat was controlled by the use of interviewer instruction guides as well as standard forms for recording of data. The mortality threat was controlled by the persistent efforts of the investigator in obtaining data from all of the subjects in both the experimental and control groups. The threat of experimenter bias could have been present in this study. The investigator was present during implementation of the treatment for the experimental group and evaluated the receptivity of the subject and his or her care giver to the teaching session. For the control group, the investigator was the physical assessor during the home visit for these subjects. The investigator collected the initial assessment data from patients in the control group. She also collected three-month and six-month data from both the experimental and control groups.

Another threat, the threat of diffusion of treatment, could also have occurred. Subjects having the same

physician could have possibly discussed the experimental treatment in the physician's office. In addition, both experimental and control subjects were members of the same community and thus social contact could have presented the occasion for diffusion of treatment. However, the fact that teaching was done on an individualized basis in the subject's home would seem to limit this threat to internal validity. Teaching in a location where both groups were present, even if not in the same room, would seem more conducive to diffusion of treatment.

Analysis of Data

The statistical procedures for this study were the chi-square test and the Student's t-test. The chi-square test is a "test of statistical significance based on comparison of the observed cell frequencies of a joint contingency table with frequencies that would be expected under the null hypothesis of no relationship" (Bohrnstedt & Knoke, 1982, p. 106). The sampling distribution of chi-square assumes that the population from which the samples were drawn was normally distributed. Demographic data, morbidity data and components of compliance were analyzed using the chi-square test.

The Student's t-test is used to compare the means of two groups to determine if a significant difference exists between them (Huck, Cormier, & Bounds, 1974). To use the t

distribution to test the difference between means the following assumptions are made: "(1) random samples are drawn from two independent, normally distributed populations, and (2) the two population variances are homoscedastic, or equal" (Bohrnstedt & Knoke, 1982, p. 183). The Student's t test was used with the summed compliance scores, the number of readmissions and the days of rehospitalization to determine if a significant difference existed between the means for the experimental group and the means for the control group on these variables.

CHAPTER IV

RESULTS

The results and a discussion of the findings for this study are presented in this chapter. Demographic data, morbidity data, and data related to compliance, hospital readmissions, and days of rehospitalization are provided, as well as statistical analysis of these data. Results of the analysis will be related to the research hypotheses.

The purpose of this study was to determine the effect of patient teaching in the home setting on patient compliance, the number of hospital readmissions and days of rehospitalization for patients with chronic congestive heart failure. The following three research hypotheses were investigated:

1. Patients with chronic congestive heart failure who have home teaching in addition to traditional education in the hospital setting will comply to a greater degree with the treatment regimen, as measured by the Compliance Assessment Guide, than patients who receive only traditional teaching in the hospital setting.

2. Patients with chronic congestive heart failure who have home teaching in addition to traditional education in the hospital setting will have fewer hospital readmissions for congestive heart failure over a six-month period following home teaching than patients who receive only

traditional education in the hospital setting.

3. Patients with chronic congestive heart failure who have home teaching in addition to traditional education in the hospital setting will have fewer days of rehospitalization for congestive heart failure over a six-month period following home teaching than patients who receive only traditional education in the hospital setting.

The statistical procedures for this study were the chi-square test and the Student's t-test. The chi-square test is "a test of statistical significance based on a comparison of the observed cell frequencies of a joint contingency table with frequencies that would be expected under the null hypothesis of no relationship" (Bohrnstedt & Knoke, 1982, p.106). Demographic data, morbidity data and components of compliance were analyzed using the chi-square test.

The Student's t-test is used to compare the means of two groups to determine if a significant difference exists between them (Huck, Cormier, & Bounds, 1974). The Student's t-test was used with the summed compliance scores, the readmission data and the rehospitalization days to determine if significant differences existed between the means of these variables for the two groups. The .05 level of significance was selected as the determinant for significant relationships in this study. Null hypotheses were used to facilitate interpretation of the

chi. sq test

chi-square statistical tests.

Subjects

A total of 129 patients were admitted to the hospital study site during the fourteen week period when subjects were being selected for the study. Seventy-two of these 129 patients became subjects for the study. Of the 57 patients who were not subjects for the study, 23 refused to participate; 11 had mental aberrations including confusion, retardation, and paranoia; 10 died during the hospitalization; 5 lived outside of the geographic study area; 5 lived in nursing homes or homes for adults; 2 were transferred to another facility for surgical treatment and 1 was referred to a home health agency.

Thirty-six of the subjects in the study were assigned to the experimental or treatment group, and 36 were assigned to a control group. Of the 36 subjects in the experimental group, one withdrew after the initial assessment interview, but before the home teaching program. The assessment data from this subject were not used in the study. The remaining 35 subjects received the home teaching program and all surviving subjects reported three month and six month compliance data. Three subjects in the experimental group died during the first three months of the study and two died during the fourth through the sixth months of the study.

All 36 subjects in the control group received the home assessment visit. All surviving subjects in the control group reported three month compliance data. All but one surviving control subject reported six month compliance data. This one male subject could not be contacted for the six month compliance data. His telephone had been disconnected and the telephone company did not have a new number. His care giver lived with him, therefore this alternative for locating him was not feasible. A review of his hospital records revealed he had not been readmitted to the study site hospital since the hospitalization that placed him in the subject pool for this study, so no current telephone number was available from this source. Five subjects in the control group died during the first three months of the study and two subjects died during the fourth through the sixth months of the study.

Demographic Characteristics

Data for the demographic variables were collected through interview using the Initial Assessment Form (see Appendix D) during the hospitalization that placed patients in the subject pool. The demographic variables of age, sex, race and education were analyzed for the subjects in the study. For age, the subjects were divided into two categories. Subjects under 70 years of age were in one category, while subjects 70 years old and older were in a

second category. Because research indicates that congestive heart failure occurs largely in the elderly population, age 70 was selected as the age of division. For the variable of sex, the categories were male and female. For the demographic variable of race, only Caucasians and Blacks were in the subject pool, therefore only these two races needed to be given consideration in the division for analysis. Two categories were used for analysis of the variable of education. Subjects who had been to school eight years or less were in one category, while subjects who had been to school eight years or more were in a second category. This categorization was selected because Romm, Hulka and Fitzhugh (1976) used it in their study of patients with congestive heart failure, and found a significant relationship between education and final symptoms of congestive heart failure at the end of the their six-month study.

In order to determine whether the two groups were statistically independent within the categories of the demographic data, four chi-square tests were performed. The null hypothesis, that the two groups were statistically independent, was tested. This hypothesis was supported in all of the demographic variables tested (see Table 1). No significant relationships were found between the experimental group and the control group on the demographic variables of age, sex, race or education.

Table 1

Frequency, Percent and Chi-square Values for Demographic Variables of the Experimental and Control Groups

Group	Demographic Variables		Total	Chi-Square Value	Chi-Square Prob
	Age				
	Under 70 yrs.	70 yrs. and older			
Experimental					
Frequency	15	20	35		
Percent	43	57	100	1.157	0.282
Control					
Frequency	11	25	36		
Percent	31	69	100		
	Sex				
	Female	Male			
Experimental					
Frequency	19	16	35		
Percent	54	46	100	0.118	0.731
Control					
Frequency	21	15	36		
Percent	58	42	100		
	Race				
	Caucasian	Black			
Experimental					
Frequency	15	20	35		
Percent	43	57	100	2.370	0.124
Control					
Frequency	22	14	36		
Percent	61	39	100		
	Education				
	8 yrs. or less	More than 8 yrs.			
Experimental					
Frequency	21	14	35		
Percent	60	40	100	0.144	0.705
Control					
Frequency	20	16	36		
Percent	56	44	100		

In relationship to the research hypotheses, the results of the chi-square test for the demographic variables reflect homogeneity of the experimental and control groups on age, sex, race and education. Therefore, differences in test results between the groups cannot be attributed to differences in the demographic variables. In addition, the results of the chi-square test on the demographic variables increases the external validity with which differences between the two groups can be attributed to the experimental treatment, the home teaching program.

Morbidity Data

Morbidity data reflect the degree of illness of the subjects. These data were collected by interview during the initial hospitalization on the form Initial Assessment Guide (see Appendix D). Variables for morbidity were divided into two categories, the patients' ability to perform activities of daily living and the patients' physical and social history.

Ability to Perform Activities of Daily Living

Patients' ability to perform activities of daily living was assessed by the frequency that they performed the activities of (1) getting drugs from the container, (2) cooking meals, and (3) needing assistance with bathing and dressing. The chi-square test was used to analyze these

variables. The null hypothesis, that the experimental group and the control group were statistically independent, was tested. The null hypothesis was supported for each of the activities of daily living. Table 2 depicts the frequencies, percents, and chi-square values for these variables. No significant relationships were found between the experimental group and the control group on the frequency with which they performed the activities of getting drugs from the container, cooking meals and needing bathing and dressing assistance.

In relationship to the research hypotheses, the results of the chi-square test for the ability to perform activities of daily living, reflect homogeneity of the experimental and control groups on frequency of getting drugs from the container, cooking meals and needing assistance with bathing and dressing. Therefore, differences in test results between the groups cannot be attributed to differences in the morbidity variables related to the ability to perform activities of daily living. In addition, the results of the chi-square test on the morbidity variables of activities of daily living increase the external validity with which differences between the two groups can be attributed to the experimental treatment, the home teaching program.

Table 2

Frequency, Percent and Chi-Square Values for Morbidity Variables Related to Activities of Daily Living Performed by the Experimental and Control Groups

Group	Activities of Daily Living				Total	Chi-Square Value	Chi-Square Prob
	Gets Drugs from Container						
	Never	Some	Most	Always			
Experimental							
Frequency	5	2	0	28	35		
Percent	14	6	0	80	100	2.097	0.552
Control							
Frequency	4	2	2	28	36		
Percent	11	6	6	79	101*		
	Cooks Meals						
	Never	Some	Most	Always			
Experimental							
Frequency	11	9	4	11	35		
Percent	31	26	11	31	99*	0.790	0.852
Control							
Frequency	13	10	5	8	36		
Percent	36	28	14	22	100		
	Bath and Dress Assistance						
	Never	Some	Most	Always			
Experimental							
Frequency	25	2	1	7	35		
Percent	71	6	3	20	100	4.664	0.198
Control							
Frequency	27	6	0	3	36		
Percent	75	17	0	8	100		

* Lesser or greater than 100 due to rounding.

Physical and Social History

The second group of morbidity variables consisted of eight factors associated with subjects' physical and social history related to the effects of congestive heart failure (see Table 3). These variables were as follows:

(1) whether or not subjects had been hospitalized previously for congestive heart failure,

(2) type of cardiovascular pathology prior to developing congestive heart failure divided into the categories of vascular diseases and heart disease (Vascular disease included hypertension and arteriosclerotic vascular disease. Heart disease included valvular disease, myocardial infarction, and angina.),

(3) presence or absence of diseases other than heart disease,

(4) whether the subjects did or did not live alone,

(5) whether subjects' type of work was manual, or sedentary, or were they retired,

(6) whether or not a job change had been necessitated by the congestive heart failure illness,

(7) length of time with diagnosis of congestive heart failure, and

(8) length of stay during initial hospitalization.

The morbidity data related to physical and social history for the experimental group were compared to the morbidity data related to physical and social history for

Table 3

Frequency, Percent, and Chi-Square Values for Morbidity Variables of Experimental and Control Groups at the time of Initial Assessment

Group	Morbidity Variable		Total	Chi-Square Value	Chi-Square Prob
	Prior Hospitalization for CHF				
	Yes	No			
Experimental					
Frequency	26	9	35		
Percent	74	26	100	4.441	0.035
Control					
Frequency	18	18	36		
Percent	50	50	100		
	Type of Cardiovascular Pathology Prior to CHF				
	Vascular	Heart			
Experimental					
Frequency	18	17	35		
Percent	51	49	100	3.044	0.218
Control					
Frequency	24	12	36		
Percent	67	33	100		
	Presence of non Heart Problems				
	Yes	No			
Experimental					
Frequency	33	2	35		
Percent	94	6	100	0.000	0.984
Control					
Frequency	35	1	36		
Percent	97	3	100		
	Lives Alone				
	Yes	No			
Experimental					
Frequency	13	22	35		
Percent	37	63	100	6.604	0.010
Control					
Frequency	4	32	36		
Percent	11	89	100		

(table continues)

Table 3 (continues)

Group	Total	Value	Prob
Type of Work			
	Manual	Sedentary	Retired
Experimental			
Frequency	0	5	30	35		
Percent	0	14	86	100	3.337	0.189
Control						
Frequency	2	2	32	36		
Percent	6	6	89	101*		
Job Change Since Diagnosed with CHF						
	Yes	No				
Experimental						
Frequency	13	22		35		
Percent	37	63		100	6.604	0.010
Control						
Frequency	4	32		36		
Percent	11	89		100		
Length of Time with Diagnosis of CHF						
	Newly Diagnosed	One yr. or less	More than one yr.			
Experimental						
Frequency	5	4	26	35		
Percent	14	11	74	99*	10.245	0.006
Control						
Freqency	17	5	14	36		
Percent	47	14	39	100		
Length of Stay During Initial Hospitalization						
	10 days or less	>10 days				
Experimental						
Frequency	25	10		35		
Percent	71	29		100	0.844	0.358
Control						
Frequency	22	14		36		
Percent	61	39		100		

*Lesser or greater than 100 due to rounding.

the control group using the chi-square test (see Table 3). The null hypothesis, that the two groups were statistically independent within the categories of these morbidity variables, was tested. The null hypothesis was supported in the categories of (1) type of cardiovascular pathology prior to diagnosis of congestive heart failure, (2) presence of non-heart problems, (3) type of work, and (4) length of stay during the initial hospitalization.

The null hypothesis was rejected for the remaining morbidity variables. Statistically significant differences were found between the experimental and control groups on the morbidity variables of (1) whether or not subjects had been previously hospitalized for congestive heart failure, (2) whether or not subjects lived alone, (3) job change since the diagnosis of congestive heart failure was made, and (4) length of time since the diagnosis of congestive heart failure was made. The experimental group had a greater number of subjects who had been hospitalized for congestive heart failure prior to the initial assessment, had a greater number of subjects who lived alone, and had a greater number of subjects who had been required to change jobs since having been diagnosed with congestive heart failure. Close examination of the type of work data indicates that these job changes were from the labor force to retirement. The control group had a greater number of subjects who were newly diagnosed with congestive heart

failure, while the experimental group had a greater number of subjects who had been diagnosed for longer than one year. The frequency, percent and chi-square values for the physical and social history morbidity variables are presented in Table 3.

In relationship to the research hypotheses, the results of the chi-square tests for the physical and social history morbidity variables of cardiovascular pathology prior to diagnosis of congestive heart failure, presence of non-heart problems, type of work, and length of stay during initial hospitalization reflect homogeneity of the experimental and control groups on these variables. Therefore, any differences between the groups that occured after the experimental home teaching cannot be attributed to previously existing differences in cardiovascular pathology prior to diagnosis of congestive heart failure, presence of non-heart problems, type of work, and length of stay during the initial hospitalization. Thus, the statistically demonstrated homogeneity of the groups on morbidity variables enhances the internal validity of the research. This is particularly important for the variable cardiovascular pathology prior to diagnosis of congestive heart failure, because Romm, Hulka & Fitzhugh (1976) found this variable to be significantly related to patients' symptoms at the end of their six-month study period. Worsening symptoms often lead to hospitalization.

For the physical and social history variables of prior hospitalization for congestive heart failure, living alone, job change since being diagnosed with congestive heart failure, and length of time since the diagnosis of congestive heart failure was made, differences were found between the groups. However, on all four of the variables, the experimental group more often exhibited characteristics associated with disease of greater severity or longer duration. Again, these findings enhance the internal validity of the research.

The variable, length of time since being diagnosed with congestive heart failure, is of particular importance. Marsh & Perlman (1972) found that patients who understood their diagnosis of congestive heart failure had been diagnosed longer than the patients who did not understand. Lack of understanding was significantly correlated with errors in taking the medication digoxin and with an increased rate of hospitalization. On the other hand, it would seem that the longer one has been diagnosed with congestive heart failure, the greater the severity of the illness, understanding that congestive heart failure is a progressive disease.

For example, in the present study, all except two patients reported taking their medications, as prescribed. One of the two who did not take the medications as prescribed said he could not afford to buy all of the

medications prescribed by his physician; the other misunderstood the prescribed dosage and took too much of a medication ordered for treatment of his chronic obstructive pulmonary disease.

Receptivity of Experimental Subjects and Care Givers to Health Teachings

Receptivity of the experimental subjects and their care givers to the teaching program was observed by the investigator and recorded on the Investigator's Receptivity Tool (see Appendix H). All of the subjects and care givers had scores of four or five indicating that they were very receptive to the teaching.

One experimental group subject, however, after having agreed to participate in the study, demonstrated a lack of receptivity. Although the appointment for the home visit was confirmed by telephone the day prior to the scheduled visit, she was not home when the investigator and nursing student arrived. Her grandchild was there to give the message about her absence. Two phone calls were made to the residence by the investigator after the visit, but no communication could be made with the subject.

Lack of receptivity was mainly observed by the investigator at the stage of the study when subjects were being solicited to participate. This lack of receptivity was evidenced by refusal to participate. Thus,

experimental subjects, except for one person, were very receptive to the home teaching program once they had agreed to be subjects for the study.

Mortality Data

Mortality data were collected by telephone by the investigator using the Compliance Assessment Guide (see Appendix F) at the end of three months and at the end of six months. Hospital records were reviewed by the investigator to verify and supplement this information. Table 4 presents the frequencies of death and causes of death for each group and within each data collection time period. The causes of death were divided into three categories; (1) congestive heart failure, (2)heart related causes such as a myocardial infarction or cardiac arrest, and (3) causes unrelated to heart disease such as pneumonia or influenza.

Experimental Group

At the end of three months, three subjects in the experimental group had died. Congestive heart failure was not listed on the medical records as the cause of death for any of the three subjects. At the end of six months, two additional subjects in the experimental group had died. Again, congestive heart failure was not listed on the medical records as the cause of these two deaths. Thus, a total of five subjects in the experimental group died

Table 4

Cause of Death for Experimential and Control Group Subjects Who Died During the Six Month Study Period

	Cause of Death			
Group	CHF	Heart Related	Other	Total
Experimental				
0-3 months	0	2	1	3
3-6 months	0	0	2	2
Total	0	2	3	5
Control				
0-3 months	1	1	3	5
3-6 months	1	1	0	2
Total	2	2	3	7

during the six month study period. However congestive heart failure was not listed on the medical records as the cause of death for any of them (see Table 4).

Control Group

At the end of three months, five subjects in the control group had died. The cause of death for one of the five subjects was congestive heart failure. At the end of six months, two additional subjects in the control group had died. Again, the cause of death for one of the two subjects who had died was congestive heart failure. Thus, during the six month study period, a total of seven subjects in the control group died. The cause of death for two of these seven subjects was congestive heart failure

(see Table 4).

Compliance

Compliance data were collected via telephone by the investigator using the Compliance Assessment Guide (see Appendix F) at the end of three months and again at the end of six months from the time of discharge from the initial hospitalization. Each of the ten components of compliance represented one aspect of the treatment regimen for patients with congestive heart failure. The components of compliance were (1) taking drugs as prescribed, (2) following the prescribed diet, (3) following prescribed rest, (4) following prescribed activity, (5) taking one's pulse, (6) weighing oneself, (7) checking one's feet for edema, (8) noting shortness of breath, (9) keeping physician appointments, and (10) calling physician between appointments. Each component of compliance was analyzed as well as a summed compliance score for the total time period.

Components of Compliance

For the ten components of compliance investigated during this study, a chi-square test was done to determine if the two groups were statistically independent. Table 5 presents the frequency, percent, and chi-square values for each component of compliance for the first three months of the study. On all ten components, the

Table 5

Frequency, Percent, and Chi-square Values for Each Component of Compliance for the Experimental and Control Groups for the First Three Months of the Study Period

Group	Components of Compliance				Total	Chi-Square Value	Chi-Square Prob
	Taking Drugs as Prescribed						
	Yes	No					
Experimental							
Frequency	32	0			32		
Percent	100	0			100	0.00	0.00
Control							
Frequency	31	0			31		
Percent	100	0			100		
	Following Prescribed Diet						
	Never	Some	Most	Always			
Experimental							
Frequency	3	3	26	0	32		
Percent	9	9	81	0	99	0.668	0.716
Control							
Frequency	3	5	23	0	31		
Percent	10	16	74	0	100		
	Following Prescribed Rest						
	Never	Some	Most	Always			
Experimental							
Frequency	0	1	2	29	32		
Percent	0	3	6	91	100	0.815	0.665
Control							
Frequency	0	1	4	26	31		
Percent	0	3	13	84	100		

(table continues)

Table 5 (continues)

Group	Never	Some	Most	Always	Total	Value	Prob
Following Prescribed Activity							
Experimental							
Frequency	4	0	0	28	32		
Percent	13	0	0	88	101*	1.854	0.173
Control							
Frequency	1	0	0	30	31		
Percent	3	0	0	97	100		
Taking Pulse							
Experimental							
Frequency	24	4	1	3	32		
Percent	75	13	3	9	100	2.398	0.494
Control							
Frequency	26	1	2	2	31		
Percent	84	3	6	6	99*		
Weighing Self							
Experimental							
Frequency	19	6	4	3	32		
Percent	59	19	13	9	100	2.566	0.464
Control							
Frequency	23	4	1	3	31		
Percent	74	13	3	10	100		
Checking Feet for Edema							
Experimental							
Frequency	0	1	0	31	32		
Percent	0	3	0	97	100	3.052	0.384
Control							
Frequency	1	0	1	29	31		
Percent	3	0	3	94	100		

(table continues)

Table 5 (continues)

Group				Total	Value	Prob
Noting Shortness of Breath						
	Never	Some	Most	Always		
Experimental						
Frequency	1	0	0	31	32	
Percent	3	0	0	97	100	2.001 0.368
Control						
Frequency	0	0	1	30	31	
Percent	0	0	3	97	100	
Keeping Doctor Appointments						
	Never	Some	Most	Always		
Experimental						
Frequency	1	3	1	27	32	
Percent	3	9	3	84	99*	0.637 0.888
Control						
Frequency	1	4	2	24	31	
Percent	3	13	7	77	99*	
Calling Doctor Between Appointments						
	Yes		No			
Experimental						
Frequency	9		23		32	
Percent	28		72		100	3.475 0.062
Control						
Frequency	3		28		31	
Percent	10		90		100	

* greater or lesser than 100 due to rounding.

experimental and control groups were statistically independent.

For the fourth through the sixth month period, the experimental and control groups were statistically independent on nine of the ten components of compliance. The components of compliance for which the two groups were statistically independent were: (1) taking drugs as prescribed, (2) following the prescribed diet, (3) following prescribed rest, (4) following prescribed activity, (5) taking pulse, (6) weighing oneself, (7) checking feet for edema, (8) noting shortness of breath, and (9) keeping doctor appointments. The experimental and control groups were not statistically independent on the component calling doctor between appointments. The subjects in the experimental group called the doctor more frequently than did the control group. Table 6 presents the frequency, percent and chi-square values for each component of compliance for the fourth through the six month time period.

In relationship to the research hypothesis, subjects in the experimental group did not have significantly higher compliance scores on any of the components except calling the doctor between appointments for the fourth through the sixth month time period. Thus, the treatment, the home teaching program, was not effective in increasing the scores on the components of compliance for the experimental group for nine of the ten components.

Table 6

Frequency, Percent, and Chi-square Values for Each Component of Compliance for the Experimental and Control Groups from the Fourth to the Sixth Month of the Study Period

Group	Components of Compliance				Total	Chi-square Value	Chi-square Prob
	Taking Drugs as Prescribed						
	Yes	No					
Experimental							
Frequency	29	1			30		
Percent	97	3			100	0.002	0.960
Control							
Frequency	27	1			28		
Percent	96	4			100		
	Following Prescribed Diet						
	Never	Some	Most	Always			
Experimental							
Frequency	3	3	24	0	30		
Percent	10	10	80	0	100	0.274	0.872
Control							
Frequency	3	4	21	0	28		
Percent	11	14	75	0	100		
	Following Prescribed Rest						
	Never	Some	Most	Always			
Experimental							
Frequency	0	1	3	26	30		
Percent	0	3	10	87	100	0.952	0.621
Control							
Frequency	0	0	3	25	28		
Percent	0	0	11	89	100		

(table continues)

Table 6 (continues)

Group					Total	Value	Prob
Following Prescribed Activity							
	Never	Some	Most	Always			
Experimental							
Frequency	3	0	0	27	30		
Percent	10	0	0	90	100	2.953	0.086
Control							
Frequency	0	0	0	28	28		
Percent	0	0	0	100	00		
Taking Pulse							
	Never	Some	Most	Always			
Experimental							
Frequency	23	3	3	1	30		
Percent	77	10	10	3	100	4.136	0.247
Control							
Frequency	23	0	2	3	28		
Percent	82	0	7	11	100		
Weighing Self							
	Never	Some	Most	Always			
Experimental							
Frequency	17	5	4	4	30		
Percent	57	17	13	13	100	7.468	0.058
Control							
Frequency	24	0	2	2	28		
Percent	86	0	7	7	100		
Checking Feet for Edema							
	Never	Some	Most	Always			
Experimental							
Frequency	0	0	1	29	30		
Percent	0	0	3	97	100	2.005	0.367
Control							
Frequency	0	1	0	27	28		
Percent	0	4	0	96	100		

(table continues)

Table 6 (continues)

Group					Total	Value	Prob
	Noting Shortness of Breath						
	Never	Some	Most	Always			
Experimental							
Frequency	1	0	1	28	30		
Percent	3	0	3	93	99*	1.933	0.380
Control							
Frequency	0	0	0	28	28		
Percent	0	0	0	100	100		
	Keeping Doctor Appointments						
	Never	Some	Most	Always			
Experimental							
Frequency	2	3	2	23	30		
Percent	7	10	7	77	101*	0.287	0.962
Control							
Frequency	1	3	2	22	28		
Percent	4	11	7	79	101*		
** Call Doctor Between Appointments							
	Yes		No				
Experimental							
Frequency	11		19		30		
Percent	37		63		100	3.784	0.052
Control							
Frequency	4		24		28		
Percent	14		86		100		

* lesser or greater than 100 due to rounding.
**Cells have counts less than expected.

Summed Compliance Scores

To analyze the degree to which subjects complied with their total treatment regimen, a summed compliance score was calculated. Each component of compliance was given a value of zero to three based on the degree of adherence to that aspect of the regimen. A component value of zero indicated that the subject never complied to that component of the treatment regimen, while a value of three indicated that the subject always complied to that component of the treatment regimen. The values from all components of the treatment regimen were summed to obtain one compliance score. Three compliance scores were obtained for each subject: one score from the three month compliance data, a second score from the four to six month compliance data, and a third score from the combined three month and four to six month data.

Table 7 presents the mean compliance scores, standard deviation and Student's t test rsults for the experimental and the control groups. The mean score for the experimental group is higher than the mean score for the control group in all three data sets. However the difference in the mean scores is very small. The standard deviation varies between the two groups and among the three data sets. In addition, the compliance score ranges for the experimental group was 30-68 while the compliance score ranges for the control group was 28-76.

Table 7

Student's t-Test Results for Experimental and Control Groups on the Variable Summed Compliance

Time Period	Experimental Group			Control Group			t
	N	M	SD	N	M	SD	
1-3 Months	32	29.78	2.97	31	28.80	2.83	1.33
4-6 Months	30	29.87	3.00	28	29.46	3.12	0.50
1-6 Months	32	57.78	8.90	31	55.41	10.58	0.96

*p < .05

A Student's t-test was done to determine if there were significant differences between the mean compliance scores of the experimental group and the mean compliance scores of the control group. The hypothesis, that the control group would have a mean compliance score equal to or greater than the mean compliance scores of the experimental group, was tested. The hypothesis was supported by all three compliance data sets.

No significant differences were found between the experimental group and the control group on the mean compliance scores for the first three months, for the fourth to sixth months or for the total six months. To relate these findings to the research hypotheses, the treatment, the home teaching program for the experimental group,

was not effective in increasing the compliance scores as measured by the Compliance Assessment Guide (Appendix F) to a level significantly greater than the control group.

Readmission Data

Data on number of readmissions were collected by the investigator through telephone interview at the end of three months and at the end of six months using the Compliance Assessment Guide (Appendix F). Readmission data were collected on the total number of readmissions, readmissions for congestive heart failure, and readmission for causes other than congestive heart failure. Data sets collected at the end of three months and at the end of six months were combined to form a third data set that reflected the total readmission data for all causes, the total readmission data for congestive heart failure, and the total readmission data for causes other than congestive heart failure. Analysis of readmission data for all causes will be presented first, then analysis of readmission data for congestive heart failure, and followed by analysis of readmission data for causes other than congestive heart failure.

Readmission Data for all Causes

Readmission data for all causes were analyzed for the experimental and control groups. Table 8 presents the

Table 8

Student's t-Test Results for Experimental and Control Groups on the Variable Readmissions for All Causes

Time Period	Experimental Group			Control Group			t
	N	M	SD	N	M	SD	
1-3 Months	35	0.45	0.82	36	0.86	0.87	2.02*
4-6 Months	32	0.56	0.76	30	0.67	0.76	0.54
1-6 Months	35	0.97	1.22	36	1.42	1.20	1.55

*p < .05

mean number of readmissions for each group, as well as the standard deviation and Student's t-test results for the first three months of the study, the fourth through the sixth months of the study and for the total study period. The mean number of readmissions for each of the time periods is greater for the control group than for the experimental group. The standard deviation varies for the two groups with the control group having a greater standard deviation during the first three months and the experimental group having the greater standard deviation during the first through the sixth months. The two groups have the same standard deviation for the fourth through the sixth months of the study. The range of readmissions for the six month time period for the experimental group was 0-5 while the range for the control group was 0-6.

To determine if there were a statistically significant difference between the mean number of combined readmissions for all causes for the experimental group and the mean number of combined readmissions for all causes for the control group, the Student's t-test was performed. The hypothesis, that the mean number of combined readmissions for all causes for the control group would be equal to or less than the mean number of combined readmissions for all causes for the experimental group, was tested.

The hypothesis was rejected at a .05 level of significance for the combined readmission data set collected for the first three months of the study. The hypothesis was supported by the combined readmission data set collected for the fourth to the sixth month of the study and for the total six months of the study period. Thus a statistically significant difference in the mean number of combined readmissions for all causes occurred in the first three months of the study. The control group had a significantly greater mean number of readmissions than did the experimental group during the first three month time period only.

Although none of the research hypotheses speak directly to number of readmissions for all causes, one of the objectives of the teaching program was to encourage early treatment for congestive heart failure and therefore prevent rehospitalization or decrease the length of stay should hospitalization become necessary. The home teaching

program was not effective in decreasing the number of readmissions for the fourth through the sixth month period or for the total six-month study period for the experimental group to a level significantly less than for the control group. However, for the first three months, the fewer readmissions for the experimental group can be attributed to the home teaching program.

Interviews with Readmitted Subjects

Each subject who was readmitted to the hospital was interviewed by the investigator utilizing the Compliance Assessment Guide. The purpose of the interview was to determine whether noncompliance was a precipitating factor for readmission.

One of the 27 control group subjects who was readmitted to the hospital during the study period had been noncompliant with one of his several medications. The one medication for which he was noncompliant was prescribed for his chronic obstructive lung disease. He was supposed to have broken the pill into halves and taken one-half in the morning and one-half in the evening. The subject stated that he did not have that understanding and he was taking a whole pill twice a day. He was admitted for toxic side effects of this drug. One of the 20 experimental subjects who was admitted during the study period was noncompliant with his diet. He ate salted pretzels as a bedtime snack.

By early morning he had developed an acute exacerbation of congestive heart failure which necessitated hospitalization. Thus, two of the forty seven subjects who were readmitted to the hospital had as a precipitating factor noncompliance with a portion of the treatment regimen. One subject was from the experimental group while the other was from the control group.

Readmissions for Congestive Heart Failure

The combined readmission data were a sum of the readmissions for congestive heart failure and readmissions for causes other than congestive heart failure. Readmission data for congestive heart failure will be analyzed at this time for the experimental and control groups. Table 9 presents the mean number of readmissions for congestive heart failure for each group, as well as the standard deviation and Student's t-test results for the first three months of the study, the fourth through the sixth months of the study, and for the total study period. The mean number of readmissions for congestive heart failure during the first three months of the study period, the fourth through the sixth months, and during the total six-month study period was less for the experimental group than for the control group. The standard deviation varies between the groups for the time periods with the largest variation being in the fourth through the sixth month time period. The range

Table 9

Student's t-Test Results for Experimental and Control Groups on the Variable Readmissions for Congestive Heart Failure

Time Period	Experimental Group			Control Group			t
	N	M	SD	N	M	SD	
1-3 Months	35	0.20	0.63	36	0.39	0.60	1.29
4-6 Months	32	0.13	0.34	30	0.33	0.48	1.99*
1-6 Months	35	0.31	0.80	36	0.67	0.89	1.75*

*p < .05

of readmissions for congestive heart failure for the six month study period showed a variation of only one readmission between the two groups; the range for the experimental group was 0-4, the range for the control group was 0-3.

To determine if a statistically significant difference existed between the mean number of readmissions for congestive heart failure for the experimental group and the means number of readmissions for congestive heart failure for the control group, a Student's t-test was calculated. The hypothesis, that the mean readmissions for congestive heart failure for the control group will be equal to or less than the mean readmissions for congestive heart failure for the experimental group, was tested. The hypothesis was rejected at the .05 level of significance for the fourth through the sixth month study period and for the total study

period. The mean number of readmissions for congestive heart failure for the control group was significantly greater than the mean number of readmissions for congestive heart failure for the experimental group during these two time periods. The hypothesis was supported by the data for the first three month time period. There was no statistically significant difference between the mean number of readmissions for congestive heart failure during the first three months of the study period for the control group and the experimental group.

In relationship to the research hypothesis, the significant difference in readmissions for congestive heart failure for the two groups for the total six month study period could be attributed to the home teaching program. Thus the research hypothesis was supported. The experimental group had fewer readmissions for congestive heart failure during the six month study period than did the control group. These findings concur with the findings of Gibson (1966), Farag and Mozar (1967) and Hancett and Torrens (1967). All of these studies added routine frequent home health visits for patients who had chronic congestive heart failure and all of the results showed significantly fewer readmissions for congestive heart failure for the experimental groups than for the control groups. The present study differed from the above studies by the number of visits and the purpose of the visit.

Readmissions for Causes Other than Congestive Heart Failure

Readmission data for causes other than congestive heart failure are presented in Table 10. The mean number of readmissions for causes other than congestive heart failure, as well as the standard deviation and Student's t-test results for the first three months of the study, the fourth through the sixth months of the study and for the total study period are depicted. The mean number of readmissions for causes other than congestive heart failure was less for the control group for the first three months of the study period, the fourth through the sixth months of the study period and for the total six months of the study period. The standard deviation showed the greatest variation in the fourth through the sixth month period and for the combined first through the sixth month time period. The range of readmissions for causes other than congestive heart failure for the six month study period was 3-8 for both the experimental and control groups.

To determine if there were a statistically significant difference between the mean number of readmissions for causes other than congestive heart failure for the experimental group and the mean number of readmissions for causes other than congestive heart failure for the control group, the Student's t-test was calculated. The hypothesis, that the mean number of readmissions for causes other than congestive heart failure for the control group would

Table 10

Student's t-Test Results for Experimental and Control Groups on the Variable Readmissions for Causes Other than Congestive Heart Failure

Time Period	Experimental Group			Control Group			t
	N	M	SD	N	M	SD	
1-3 Months	35	3.80	0.63	36	3.61	0.60	1.29
4-6 Months	32	3.88	0.34	30	3.67	0.48	1.99*
1-6 Months	35	7.34	1.40	36	6.67	1.55	1.93*

*p < .05

be equal to or less than the mean number of readmissions for causes other than congestive heart failure for the experimental group, was tested.

The hypothesis was supported for the first three months of the study period, the fourth through the sixth months of the study period, and for the total six months of the study period. The experimental group did not have a mean number of readmissions for causes other than congestive failure that was less than the control group for any of the time periods. However, the control group had a mean number of readmissions for causes other than congestive heart failure that was significantly less than the mean number of readmissions for causes other than

congestive heart failure for the experimental group in the fourth through the sixth month time period and in the total six month time period.

In relationship to the research hypothesis, no specific hypothesis was related to admissions for causes other than congestive heart failure. However, the results of readmissions for patients with chronic congestive heart failure for causes other than congestive heart failure were investigated in two research studies. Gibson (1966) in a 13 month study, had added monthly visits by a public health nurse to the treatment regimen. He found that the number of readmissions for causes other than congestive heart failure was not significantly different for the experimental and control groups. Farag and Mozar (1967) in their year study, added a total of 30 visits per patient by a health educator, nurse and/or nutritionist, to the routine clinic care. Their findings concurred with the findings of Gibson.

Days of Rehospitalization Data

Data on days of rehospitalization were collected by the investigator via telephone interview at the end of three months and at the end of six months using the Compliance Assessment Guide. Days of rehospitalization data were collected on the total number of days of rehospitalization, days of rehospitalization for congestive heart failure,

and days of rehospitalization for causes other than congestive heart failure. Data sets collected at the end of three months and at the end of six months were combined to form a third data set that reflected the total days of rehospitalization for congestive heart failure, the total days of rehospitalization for causes other than congestive heart failure and the total combined days of rehospitalization for congestive heart failure and for causes other than congestive heart failure. Analysis of days of rehospitalization data for all causes will be presented first, then analysis of days of rehospitalization data for congestive heart failure, and followed by analysis of days of rehospitalization data for causes other than congestive heart failure.

Days of Rehospitalization for All Causes

Days of rehospitalization data for all causes were analyzed for the experimental and control groups. Table 11 presents the mean number of days of rehospitalization for each group, the standard deviation and the Student's t-test results for the first three months of the study, the fourth through the sixth months of the study and for the total study period. The mean days of rehospitalization for the first three months was 3.57 for the experimental group and 8.81 for the control group. The means for the fourth through the sixth month time period revealed similar

Table 11

Student's t-Test Results for Experimental and Control Groups on the Variable Days of Rehospitalization for all Causes

Time Period	Experimental Group			Control Group			t
	N	M	SD	N	M	SD	
1-3 Months	35	3.57	6.90	36	8.81	9.93	2.57*
4-6 Months	32	3.88	5.84	30	7.47	10.86	1.64*
1-6 Months	35	7.11	9.22	36	15.03	15.01	2.67*

*p < .05

findings to the first three month period. For the total time period, the mean for the experimental group was 7.11, while the mean for the control group was 15.03. The standard deviation for the two groups during each of the time periods varied widely. The range and median for the six-month study period varied widely also. The range of days of rehospitalization for all causes during the six-month study period was 0-39 for the experimental group and 0-55 for the control group. The median days for the experimental group was 4.0 while the median days for the control group was 11.5.

To determine if there were a statistically significant difference between the mean number of combined days of rehospitalization for all causes for the experimental group

and the mean number of combined days of rehospitalization for all causes for the control group, the Student's t-test was calculated. The hypothesis, that the mean number of combined days of rehospitalization for all causes for the control group would be equal to or less than the mean number of combined days of rehospitalization for all causes for the experimental group, was tested.

The hypothesis was rejected at the .05 level of significance by the data for the first three months of the study, the fourth through the sixth months of the study and for the total six months of the study. This analysis indicated that the control group had a significantly greater mean number of days of rehospitalization during all three time periods than did the experimental group.

In relationship to the research hypotheses, none speak directly to days of rehospitalization for all causes. However, objectives of the teaching program related seeking early treatment for congestive heart failure and other illnesses to preventing rehospitalization or decreasing the stay should hospitalization become necessary. These findings, that the days of rehospitalization for all causes was less for the experimental group than for the control group, can be attributed to the home teaching program.

Days of Rehospitalization for Congestive Heart Failure

The days of rehospitalization were categorized into

days of rehospitalization for congestive heart failure and days of rehospitalization for causes other than congestive heart failure. Days of rehospitalization for congestive heart failure data will be presented at this time for the experimental and control groups. Table 12 presents the mean number of days of rehospitalization for congestive heart failure for each group, as well as the standard deviation and Student's t-test results for the first three months of the study, the fourth through the sixth months of the study, and for the total study period. The mean number of days of rehospitalization for congestive heart failure was less for the experimental group in all three time periods than the mean number of days of rehospitalization for the control group. The standard deviation was also less for the experimental group than for the control group for all three time periods. The range for days of rehospitalization for congestive heart failure during the total six-month period was 0-28 for the experimental group and 0-30 for the control group. The median days of rehospitalization for the experimental group was 10.0 while the median days for the control group was 14.7.

To determine if a statistically significant difference existed between the mean number of days of rehospitalization for congestive heart failure for the experimental group and the mean number of days of hospitalization for congestive heart failure for the control group, the Student's t-test

Table 12

Student's t-Test Results for Experimental and Control Groups on the Variable Days of Rehospitalization for Congestive Heart Failure

Time Period	Experimental Group			Control Group			t
	N	M	SD	N	M	SD	
1-3 Months	35	1.83	5.69	36	3.31	5.70	1.09
4-6 Months	32	0.97	2.66	30	3.57	5.68	2.33*
1-6 Months	35	2.71	6.58	36	6.28	8.60	1.96*

*p < .05

was calculated. The hypothesis, that the mean number of days of rehospitalization for congestive heart failure for the control group will be equal to or less than the mean number of days of rehospitalization for the experimental group, was tested. The hypothesis was rejected at the .05 level of significance by analysis of the fourth through the sixth month data and of the total six-month data. The hypothesis was supported by analysis of the first through the third month data. Results of this analysis indicated that the experimental group had significantly fewer days of rehospitalization for congestive heart failure during the fourth through the sixth month time period and for the total time period, than did the control group.

In relationship to the research hypotheses, that pa-

tients with chronic congestive heart failure who have home teaching in addition to the traditional teaching will have fewer days of rehospitalization for congestive heart failure over a six-month period following home teaching than patients who receive only traditional education in the hospital setting, was supported. The differences in days of rehospitalization for congestive heart failure can be attributed to the home teaching program. Gibson (1966) and Hanchett and Torrens (1967) in their studies of days of rehospitalization following the addition of regular, frequent home health visits to the treatment regimen, found a significant difference in days of rehospitalization between the experimental and control groups.

Days of Rehospitalization for Causes Other than Congestive Heart Failure

Days of rehospitalization for causes other than congestive heart failure will be analyzed at this time. Table 13 presents the mean number of days of rehospitalization for causes other than congestive heart failure, the standard deviations and Student's t-test results for the first three months of the study, the fourth through the sixth months of the study and for the total study period. The mean number of days of rehospitalization for all three time periods is less for the experimental group than for the control group. The range and median are also less for the experimental group for the six-month study period than

Table 13

Student's t-Test Results for Experimental and Control Groups on the Variable Days of Rehospitalization for Causes Other than Congestive Heart Failure

Time Period	Experimental Group			Control Group			t
	N	M	SD	N	M	SD	
1-3 Months	35	1.74	4.11	36	5.50	8.87	2.28*
4-6 Months	32	2.91	4.83	30	3.90	9.01	0.54
1-6 Months	35	4.44	6.08	36	8.75	12.67	1.84*

*p < .05

for the control group. The range for days of rehospitalization for causes other than congestive heart failure for the experimental group was 0-22 while the range for the control group was 0-55. The median number of days for the experimental group was 6.5; the median number of days for the control group was 12.0.

To determine if a statistically significant difference between the mean number of days of rehospitalization for causes other than congestive heart failure for the experimental group and the mean number of days of rehospitalization for causes other than congestive heart failure for the control group existed, the Student's t-test was calculated. The hypothesis, that the mean number of days of

rehospitalization for causes other than congestive heart failure would be equal to or less for the control group than for the experimental group, was tested.

The hypothesis was rejected at the .05 level of significance by analysis of the data from the first through the third months and from the data reflecting the total six-month study period. For the first through the third month and for the total six-month time periods, the control group had a significantly greater number of days of rehospitalization for causes other than congestive heart failure than did the experimental group. The hypothesis was supported by analysis of the data from the fourth through the sixth month of the study period. There was no statistically significant difference between the two groups in the mean number of days of rehospitalization for causes other than congestive heart failure during this time period.

The research hypotheses do not speak specifically to days of rehospitalization for causes other than congestive heart failure. However, one aspect of the health teaching program included the relationship of congestive heart failure to acute illness with the implication being that early treatment may prevent acute exacerbations of congestive heart failure and possibly further heart damage. The mortality findings of this study are supportive of this concept. Of the 12 subjects who died during the study period, only two had congestive heart failure as the cause

of death.

Summary

Demographic variables, morbidity variables, and the variables of compliance, readmissions and days of rehospitalization were analyzed and discussed in this chapter. The major findings for each variable will be reviewed in the summary. These findings will also be related to the research hypothesis.

The experimental and the control groups were statistically independent on the demographic variables of age, sex, race, and education. The two groups were also statistically independent on the following morbidity variables: (1) activities of daily living, (2) cardiovascular pathology prior to being diagnosed with congestive heart failure, (3) presence of non-heart problems, (4) type of work, and (5) length of stay during the initial hospitalization. Significant differences were found between the two groups on the following morbidity variables: (1) prior hospitalization for congestive heart failure, (2) lives alone, (3) job change, and (4) length of time since diagnosis of congestive heart failure was made.

The first research hypothesis, patients with chronic congestive heart failure who had home teaching in addition to the traditional education in the hospital setting will have a significantly higher score on the Compliance Assessment Guide than patients who receive teaching only in

the hospital setting, was not supported by data analysis. When individual components of compliance were analyzed using the chi-square test, no significant differences were found between the two groups except for the component calling the doctor between appointments for the fourth through the sixth time period. The experimental group called the doctor more frequently than did the control group. When the components of compliance were summed, Student's t-test results indicated that no significant differences existed between the two groups. Thus the home treatment program was not effective in increasing the compliance scores.

The second research hypothesis, patients with chronic congestive heart failure who have home teaching in addition to the traditional education in the hospital setting will have fewer readmissions to the hospital for congestive heart failure over a six month period following home teaching than patients who receive only the traditional education in the hospital setting, was supported by Student's t-test analysis of readmission for congestive heart failure data. This difference between the two groups can be attributed to the effectiveness of the home teaching program for the experimental group.

The third research hypothesis, patients with chronic congestive heart failure who have home teaching in addition to the traditional education in the hospital setting will have fewer days of rehospitalization for congestive heart

failure over a six month period following home teaching than patients who receive only traditional education in the hospital setting, was supported by Student's t-test analysis of days of rehospitalization for congestive heart failure data. Subjects in the experimental group did have fewer days of rehospitalization for congestive heart failure than did the control group. The difference between the two groups can be attributed to the effectiveness of the home teaching program for the experimental group.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

This study was conducted to determine the effect of patient teaching in the home setting on compliance to one's home care regimen, the number of hospital readmissions, and the days of rehospitalization for patients with chronic congestive heart failure. An experimental design was used with subjects randomly assigned to either the experimental or the control group. Both groups received traditional education in the hospital setting. In addition, the experimental group received the home health teaching program and the control group received an assessment visit for the purpose of counteracting the Hawthorne effect. Data were collected from both groups by the investigator via telephone interview three months and six months after the initial hospitalization.

The study was guided by the following hypotheses:

1. Patients with chronic congestive heart failure who have home teaching in addition to traditional education in the hospital setting will comply to a greater degree with the treatment regimen, as measured by the Compliance Assessment Guide, than patients who receive only traditional teaching in the hospital setting.

2. Patients with chronic congestive heart failure who have home teaching in addition to traditional education in

the hospital setting will have fewer hospital readmissions for congestive heart failure than patients who receive only traditional education in the hospital setting.

3. Patients with chronic congestive heart failure who have home teaching in addition to traditional education in the hospital setting will have fewer days of rehospitalization for congestive heart failure than patients who receive only traditional education in the hospital setting.

Subjects were drawn from patients who had been admitted to an urban hospital located in southeast Virginia with a diagnosis of congestive heart failure and who met the folowing criteria:

1. Upon discharge, went home rather than to another health care facility,
2. Were not referred to a home health agency for follow-up care,
3. Were alert and displayed no evidence of severe confusion or other mental aberration,
4. Agreed to participate in the study, and
5. Whose physician expressed willingness to have them solicited for inclusion in the study.

Subjects in both the experimental and control groups were interviewed prior to hospital discharge. Demographic and morbidity data were obtained and arrangements were made for the home visit. The day before the home visit was made, the appointment for the scheduled time was confirmed.

Instructors for the home teaching program for the subjects in the experimental group were senior nursing students. These students were attending a three year diploma school of professional nursing accredited by the National League for Nursing. They were enrolled in the course, Management of Patient Care. Academic credit was awarded to the students for implementing the home teaching program. No payment was made to the students who participated in the study, but transportation to and from the hospital to the patient's home was provided .

The home teaching program for the experimental subjects was implemented within seven days after hospital discharge. The timing was designed for implementing the program at the psychosocial stage of adaptation to illness most conducive to learning. The home environment was selected to promote environmental and psychological comfort conducive to learning. The teaching program was based on an individualized care plan reflecting general measures for patients with congestive heart failure as well as measures prescribed by the physician to meet specific patient needs. Content areas included in the care plan were (1) pathology of congestive heart failure, (2) function, dosage, frequency and major side effects of prescribed medications, (3) prescribed diet, (4) activity and rest, (5) observations and measures for monitoring the disease, (6) warning signs of decompensation, (7) follow-up care, and (8) relationship

of acute illnesses to congestive heart failure.

The assessment visit for the control group was made by the investigator within one week after hospital discharge. The nursing functions performed during this home visit for the control group consisted of taking the blood pressure and pulse, and checking the feet for edema. Conversation during the visits was related to how the subjects were feeling. No mention was made of their treatment regimen.

The statistical procedures for this study were the chi-square test and the Student's t-test. The chi-square test is "a test of statistical significance based on a comparison of the observed cell frequencies of a joint contingency table with frequencies that would be expected under the null hypothesis of no relationship" (Bohrnstedt & Knoke, 1982, p.106). Demographic data, morbidity data and components of compliance were analyzed using the chi-square test. The Student's t-test is used to compare the means of two groups to determine if a significant difference exists between them (Huck, Cormier, & Bounds, 1974). This test was used with the summed compliance scores, the readmission data and the number of days of rehospitalization to test for the differences in the means of these variables between two groups. An alpha level of .05 was selected to indicate statistical significance. Statistical hypotheses were used to facilitate interpretation of the statistical tests.

Conclusions Related to Demographic and Morbidity Variables

Demographic characteristics and morbidity data were analyzed using the chi-square test. Results showed that the two groups were statistically independent in all of the demographic categories. The two groups were also statistically independent in the morbidity categories related to ability to perform activities of daily living, type of cardiovascular pathology prior to development of congestive heart failure, presence of non-heart problems, type of work, and length of stay at the time they entered the study. The demographic and morbidity variables for which the experimental and control groups were statistically independent, cannot be credited for significant test differences that occur between the two groups.

The experimental group and control group were not statistically independent on the morbidity variables of whether subjects had been hositalized previously for congestive heart failure, whether subjects lived alone, whether a job change had been necessitated by the congestive heart failure, and length of time since the diagnosis of congestive heart failure had been made. Significant test differences could be attributed to these variables. Thus, these morbidity variables could possibly be threats to internal validity.

The statistically significant morbidity variables were

examined for their possible effect on the results of the study. More subjects in the experimental group than in the control group had been hospitalized previously for congestive heart failure. It might be expected that subjects who had been hospitalized previously would have a more advanced stage of congestive heart failure than those subjects who had not required hospitalization previously. Patients with advanced stages of congestive heart failure are generally hospitalized more than patients who have less advanced stages of heart failure.

On the other hand, subjects who had been hospitalized previously would have been exposed to the traditional teaching in the hospital setting prior to the study period. However, the fact that rehospitalization had been required at this time may be evaluative of the effectiveness of that teaching. Should further research be done utilizing patients with congestive heart failure, investigators may choose to use as a criterion for exclusion from the study patients who had previously been hospitalized for congestive heart failure. Another possibility for evaluating the effect of this variable is to use it as the criterion for division of subjects into groups.

Analysis of data showed that a statistically greater number of subjects in the control group lived alone as compared to the experimental group. These data could indicate that those with a less advanced stage of

congestive heart failure are more able to live alone and probably would have less rehospitalizations. However, an equally important factor determining living arrangements may be family social relationships. Most patients with congestive heart failure are in the older age group where spouses and sometimes children have already died. Many choose to live alone as long as possible, whereas others either still live with spouses or have choosen to live with family members or friends. Every subject in the study had a care giver although some caregivers did not live with the subject. There were no subjects in either group who did not have someone to check in on them every day and to assist them with errands. In addition, analysis of the activities of daily living morbidity variables did not reveal a significant difference between the two groups. It would seem that these variables would be closely related to the ability to live alone. Thus, a direct relationship between severity of illness and living alone may not exist.

Data analysis further showed that a statistically larger number of subjects in the experimental group had been required to change jobs since being diagnosed with congestive heart failure than had been the case with subjects in the control group. It would seem that the severity of congestive heart failure would be greater for the subjects who had been required to change jobs. However, when the frequency of subjects who are retired at the present time

is scrutinized, 30 for the experimental group and 32 for the control group, it can be surmised that more subjects in the experimental group were working when they were diagnosed as having congestive heart failure. Thus, it would seem that the present work status would have a greater effect on future hospitalizations than the historical factor.

The control group had a statistically larger number of subjects who were newly diagnosed at the time of inclusion into the study with congestive heart failure while the experimental group had more subjects that had been diagnosed for longer than a year. Approximately equal numbers in each group had been diagnosed less than a year. Generally speaking, the longer a patient has been diagnosed as having congestive heart failure the more severe the condition and the more hospitalizations might be required (Smith and Braunwald, 1984). Marsh and Perlman (1972), however, found in their study of patients with congestive heart failure, that patients who understood their illness had been diagnosed longer and required less hospitalizations. Lack of understanding, on the other hand was significantly correlated with failure to take medication and an increased rate of hospitalization. In the present study, all patients received the traditional education in the hospital setting, while only the experimental group received education in the home setting.

Review of the morbidity variables that were statisti-

cally significant at the .05 level would seem to indicate that the experimental group had subjects with greater morbidity than did the control group. Since the course of congestive heart failure is progressive, any significant changes related to rehospitalizations could be credited to the effectivceness of treatment, the home health teaching program.

Conclusions Related to the Research Hypotheses

Data related to the research hypotheses were collected by the investigator via telephone interview utilizing the Compliance Assessment Guide (see Appendix F) at the end of three months and at the end of six months. The data were verified and supplemented with information from their hospital medical records by the investigator. Analysis of these data showed support for two of the three hypotheses.

The first research hypothesis, that patients with chronic congestive heart failure who had home teaching in addition to the traditional education in the hospital setting will have a significantly higher score on the Compliance Assessment Guide than patients who receive teaching only in the hospital setting, was not supported by data analysis. When individual components of compliance were analyzed using the chi-square test, no significant differences were found between the two groups except for the component calling the doctor between appointments for the

fourth through the sixth time period. The experimental group called the doctor more frequently than did the control group during the fourth through the sixth month period. When the components of compliance were summed, Student's t-test results indicated that no significant differences existed between the two groups. Thus the home treatment program was not effective in increasing the compliance scores as measured by the Compliance Assessment Guide.

It is the conclusion of the investigator that this instrument did not account for the judgement needed to effectively utilize the information obtained from implementing the treatment regimen. An instrument is needed that is sensitive to patients' judgement as well as compliance with treatment regimens.

Of additional interest is the fact that on only one component of compliance was a statistically significant difference found between the experimental and control groups. The experimental group called the doctor more frequently between appointments than the control group did. One possible explanation for this finding is that subjects in the experimental group profited from the home teaching to the extent that they were more likely to consult a doctor about their condition.

The second research hypothesis, that patients with chronic congestive heart failure who have home teaching in addition to the traditional education in the hospital

setting will have fewer readmissions to the hospital for congestive heart failure over a six month period following home teaching than patients who receive only the traditional education in the hospital setting, was supported by Student's t-test analysis of readmission for congestive heart failure data. This difference in the two groups can be attributed to the effectiveness of the home teaching program for the experimental group.

The third research hypothesis, that patients with chronic congestive heart failure who have home teaching in addition to the traditional education in the hospital setting will have fewer days of rehospitalization for congestive heart failure over a six month period following home teaching than patients who receive only traditional education in the hospital setting, was supported by Student's t-test analysis of days of readmission for congestive heart failure data. The differences between the two groups can be attributed to the effectiveness of the home teaching program for the experimental group.

Conclusions Related to Number of Readmission and Days of Rehospitalization for Causes Other than Congestive Heart Failure

A Student's t-test was used to compare the means for the variable readmission for causes other than congestive heart failure. The hypothesis that the mean number of readmissions for the control group for causes other than

congestive heart failure would be equal to or less than the mean number of readmissions for causes other than congestive heart failure for the experimental group was supported by analysis of the first three month data, by the fourth through the sixth month data and by the combined first three month and fourth through the sixth month data. For each time period, the mean number of readmissions for the experimental group was greater than the mean number of readmissions for the control group and for the latter two data sets there were statistically significant differences between the two groups. One possible explanation for these findings could be that one of the components of the teaching plan for the experimental group was emphasizing that acute illnesses are stressors to the heart. When one already has a severe heart disease, obtaining prompt medical treatment for acute illnesses may prevent further heart damage that could be caused should treatment be delayed or not obtained. Therefore, subjects from the experimental group were more alert to seeking medical attention for acute illnesses other than congestive heart failure than were the control group..

A Student's t-test was used to compare the mean days of rehospitalization for causes other than congestive heart failure. The hypothesis, that the mean days of rehospitalization for causes other than congestive heart failure for the control group would be equal to or less than the mean

days of rehospitalization for causes other than congestive heart failure for the experimental group, was rejected by the first three months data, and the total first through the sixth month data. The fourth through the sixth month data supported the hypothesis. The experimental group, in all three time periods, had less days of rehospitalization for causes other than congestive heart failure than did the control group. This finding supports conclusions drawn for the possible reason that the experimental group had more readmissions for causes other than congestive heart failure than did the control group. If treatment for acute illnesses is obtained early, it is expected that the acute illness will be less severe and require less days of rehospitalization.

Conclusions Related to the Home Teaching Program Effectiveness

The conclusions related to the home teaching program based on hypothesis support are as follows:

1. The home teaching program was effective in reducing the number of readmissions to the hospital and in reducing the number of days of rehospitalization for patients with congestive heart failure.
2. The home teaching program was effective in reducing morbidity as evidenced by decreased acute treatment requirements.

Characteristics of the teaching program based on the literature review which may have promoted effectiveness:

1. The program was based on the individual patient's needs. Priority concerns were addressed first.
2. The program was taught on an individual rather than group basis. This approach promoted effective patient nurse interaction and a means for constant feedback, reinforcement, and evaluation.
3. The program was based on a formal teaching plan rather than informal as is characteristic of the traditional education in the hospital setting.
4. The program contained objectives on which the short term evaluation of learning was based.
5. Written materials were used as teaching tools and left with the patient for reinforcement and future reference.
6. Appointments for the time that the teaching program was to be presented were made with the patient so that physical and psychological comfort would be maximized.
7. The program was presented in the home setting where environmental comfort could be maximized.
8. The timing of the presentation in relationship to the time of occurrence of the acute illness allowed time for the patient to be in the psychosocial stage of resolution or rehabilitation, which is the stage most

conducive to learning.

Recommendations for Further Research

It is recommended that the following studies be conducted:

1. A replication of this study in other locations to increase the generalizability of the results.
2. A replication of this study controlling for the variable of previous hospitalization for congestive heart failure.
3. A replication of this study controlling for the variable of whether the subject lives alone or with other.
4. A replication of this study controlling for the variable length of time since the diagnosis of congestive heart failure was made.
5. A replication of this study utilizing a more sensitive instrument for measuring the judgement aspect of compliance.
6. A comparative study of compliance, readmissions, and days of rehospitalization for one group of patients with congestive heart failure who have a planned comprehensive teaching program in the hospital setting and a second group of patients with congestive heart failure who have a planned comprehensive teaching program in the home setting.

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Appendix A

Petersburg General Hospital
801 SOUTH ADAMS STREET, PETERSBURG, VIRGINIA 23803 TELEPHONE 862-5000

April 2, 1986

Mrs. Betty Sue Ashby, R.N.
Assistant Professor, School of Nursing
Petersburg General Hospital
801 S. Adams Street
Petersburg, Virginia 23803

Dear Mrs. Ashby:

Permission is granted for you to conduct your research study on the effectiveness of home health teaching with congestive heart failure patients discharged from Petersburg General Hospital. I understand that you will follow the criteria as set forth in your letter to me of March 26, 1986. I will be interested in receiving a copy of the results of your study.

[redacted]
Executive Director

KHSJr:emc

cc: Dr. Clementine Pollok
Director, School of Nursing

Appendix B

Betty Sue Ashby, R.N.. M.S.
Assistant Professor, School of Nursing
Petersburg General Hospital
Petersburg, Virginia 23803

Dear Mrs. Ashby:

I understand that you are conducting a study to determine the effectiveness of patient teaching on compliance, number of hospital readmissions, and days of rehospitalization for patients with chronic congestive heart failure during a six month period. I am giving you permission to ask my patients to participate in the study. I understand that each patient who participates in the study will also give informed consent.

Yours truly,

_____

Physician

Appendix C

Congestive Heart Failure Project

Informed Consent

I, the undersigned, agree to participate in a project conducted by Betty Sue Ashby, a graduate student at Virginia Commonwealth University. I understand that the purpose of the project is to determine the effectiveness of teaching patients with congestive heart failure about home care.

I agree to answer questions about my congestive heart failure. I also agree to a home visit by Mrs. Ashby and a senior nursing student. In addition, I agree for Mrs. Ashby to use my medical records to obtain my physician's plan of care for me. I understand that I will receive a telephone call from Mrs. Ashby in approximately three months and again in approximately six months to inquire about how I am doing with my home care. I agree that Mrs. Ashby has anwswered any questions that I had about the project.

I understand that participation in this project is entirely voluntary and whether or not I participate will in no way affect my routine medical and nursing care. I understand that I may terminate my participation in the project at any time by telephoning Mrs. Ashby at [redacted].

_____

Patient

Appendix D

Congestive Heart Failure Study

Initial Assessment Guide

1. Can you tell me the month and year when you were first diagnosed as having congestive heart failure?

   _____

2. Have you been in the hospital before, for congestive heart failure? ___Yes ___No (If yes)

   a. How many times? _____

   b. How many days were you in the hospital the last time you were hospitalized for congestive heart failure?

      _____ the time before that? _____

3. Did you have any kind of heart problem before you had congestive heart failure? ___Yes ___No (If yes)

   What was the problem?_____

4. Do you have any medical problems other than your heart problem? ___Yes ___ No (If yes)

   What other problems do you have?

   1._____ 4._____

   2._____ 5._____

   3._____ 6._____

5. Tell me how you take care of yourself at home.

   a. Do you live alone? ___Yes ___No (If no)

      Who lives with you (Name and relationship)?

      _____

      _____

      _____

b. How often do you get your own medicine from the container and take it?

___ Never ___ Most of the time

___ Some of the time ___ All of the time

c. How often do you cook your own meals?

___ Never ___ Most of the time

___ Some of the time ___ All of the time

d. How often do you need assistance to bath and dress yourself?

___ Never ___ Most of the time

___ Some of the time ___ All of the time

6. What kind of work do you do now? (Let patient answer, then interviewer will fill in the appropriate category.)

___ Manuel ___ Sedentary ___ Retired

7. Since you became ill with congestive heart failure, have you changed your job to something that places less strain on your heart? ___Yes ___ No

8. How many years did you go to school? _____

Appendix E

Congestive Heart Failure Study

Initial Assessment Guide - Interviewer Instruction

Date:_____ Stamp with Addressograph Plate

Roon Number:_____

Name:_____

Address:_____

Telephone Number:_____ Sex:___Male ___Female

Race:___Caucasian ___Black ___Other

Group:___Experimental ___Control

_____(Patient's Name)__, I am __(student's name)__, a senior student in the School of Nursing. Mrs. Ashby spoke with you about participating in a study of patients with congestive heart failure? She told you I would be coming to ask you a few questions about your disease?

(Student: If you assess that the patient is not physically well enough to answer the questions, say) You seem to not be feeling very well right now. Would it be better if I came back later to talk with you? I will be back __(approximate time)__.

Would it be convenient for you to talk with me for about 15 minutes now?

(Student: If the patient says no, say) When would it be convenient for me to come back? Then I will be back _(approximate time)__.

(Student: If the patient says yes, proceed with the questions).

(Student: At the end of questions say)

Thank you for answering all of my questions. You agreed to participate in a one-hour study session at your home after you are discharged from the hospital. I will be visiting you to talk about your medicines, diet, and exercise and to help you to learn how to manage your disease. Could we discuss a time that would be convenient for me to visit?

Student: Plan the visit on the day that you are assigned for your community experience).

State date and time of scheduled visit: _____

Appendix F

Congestive Heart Failure Study

Compliance Assessment Guide

1. What medications are you taking?

   a. What dosage?

   b. How often?

   c. Are you taking it as your doctor prescribed?

Medication	Dosage	Frequency	As Prescribed

2. Since you were discharged from the hospital, have you been able to follow your diet? Can you tell me how often?

   ___ Never = 0

   ___ Some of the time = 1

   ___ Most of the time = 2

   ___ All of the time = 3

3. Since you were discharged from the hospital, how often do you rest?

   ___ Never = 0

   ___ Some of the time when I feel tired = 1

   ___ Most of the time when I feel tired = 2

   ___ Any time that I feel tired = 3

4. Since you were discharged from the hospital, how often do you walk or do active things?

___ Never = 0
___ 1 to 2 times a week = 1
___ 3 to 4 times a week = 2
___ Daily unless I don't feel well = 3

5. Since you were discharged from the hospital, how often do you

a. take your own pulse?

___ Never = 0
___ 1 to 2 times a week = 1
___ 3 to 4 times a week = 2
___ Daily = 3

b. weigh yourself?

___ Never = 1
___ 1 to 2 times a week = 1
___ 3 to 4 times a week = 2
___ Daily = 3

c. check for swelling in your feet?

___ Never = 0
___ 1 to 2 times a week = 1
___ 3 to 4 times a week = 2
___ Daily = 3

d. note if you are short of breath

___ Never = 0
___ 1 to 2 times a week = 1
___ 3 to 4 times a week = 2
___ Daily = 3

6. Since you were discharged from the hospital, how often have you kept your appointment with the doctor?

___ Never = 0
___ Some of the time = 1
___ Most of the time = 2
___ All of the time = 3

7. Since you were discharged from the hospital, have you called your doctor to report any problems that you have had or to ask any questions about your care? ___ Yes = 3 ___ No = 0 (If yes)

   How many times? _____

8. Have you been admitted to the hospital as a patient since __(month and week)__ when I visited you there? (If yes)

   a. How many times? _____

   b. At what hospital were you treated? _____

   _____

   c. What was your problem when you were admitted to the hospital? _____

   _____

   d. How many days were you in the hospital? (List days for each admission)

   _____

   _____

Appendix G

Congestive Heart Failure Study

Compliance Assessment Guide - Interviewer Instruction

Date: _____

Patient's Name: _____

Assessment Period:

___ 0-3 Months

___ 4-6 Months

___ Readmission

Interviewer's Introduction:

I am Betty Sue Ashby from Petersburg General Hospital. I talked to you when you were in the hospital about your congestive heart failure and visited you after you went home. Could I ask you a few questions about how you have been doing since the last time I talked with you.

Appendix H

Congestive Heart Failure Study

Investigator's Receptivity Instrument

Receptivity	Patient					Care Giver				
	1	2	3	4	5	1	2	3	4	5
Attentive	___	___	___	___	___	___	___	___	___	___
Has eye contact	___	___	___	___	___	___	___	___	___	___
Looks at handouts	___	___	___	___	___	___	___	___	___	___
Asks questions	___	___	___	___	___	___	___	___	___	___
Responds to questions	___	___	___	___	___	___	___	___	___	___
Repeats critical directions	___	___	___	___	___	___	___	___	___	___

Scale: 1 = Poorly receptive; 5 = Very receptive.

Patient's Name: _____

Care Givers (List):

1. _____
2. _____
3. _____

How valuable do you feel this information is, in helping you to control the symptoms of your congestive heart failure? _____

Appendix I

Home Visits for the Experimental Group

Content Guideline and Teaching Objectives

I. Pathophysiology

A. Explains the function of the heart as a pump.

B. Explains the pathophysiology of congestive heart failure as an inadequate pump.

C. Relates inadequate pump function with symptoms of fatigue, edema, shortness of breath, and weight gain.

II. Medications

A. Discusses function of each prescribed medication in relationship to congestive heart failure.

B. Reviews prescribed dosage and frequency for each medication.

C. Presents major side effects of each medication with methods of detection.

D. Demonstrates check-off systems for assurance that medications have been taken.

III. Diet

A. Uses the patient's written diet plan as a guide for identifying permitted and restricted foods.

B. Discusses examining labels for sodium content.

C. Discusses omitting salt.

D. Discusses salt substitutes and spice shakers.

E. Discusses avoiding excessive eating and drinking.

IV. Activity and rest

A. Reviews activity program.

B. Discusses the need to increase walking and other activities gradually to prevent fatigue and dyspnea.

C. Discusses stabilization of activity at level that produces no symptoms.

D. Stresses need for regular daily rest periods.

E. Stresses need to avoid emotional upsets.

F. Stresses need to avoid extremes of heat and cold.

V. Monitoring disease

A. Stresses the need to

1. Take pulse daily.

2. Weigh daily at same time of day.

3. Observe for fluid retention.

B. Observes for reoccurence of symptoms experienced when illness began.

VI. Warning signs of decompensation

A. Discusses symptoms which should be reported to physician promptly:

1. Pulse less than 60 or greater than 100 beats per minute at rest.

2. Sudden weight gain of two to three pounds in one or two days.

3. Shortness of breath with usual activity.

4. Shortness of breath at night.

5. Swelling of ankles, feet or abdomen.

6. Persistent cough.

7. Frequent voiding at night.

8. Fatigue or general slowing down in ability to perform daily work.

B. Discusses prompt reporting of the reoccurence of symptoms experienced when illness began.

VII. Follow-up care

A. Discusses the need to keep regular appointments with physician.

B. Discusses the relationship between repeated acute episodes of congestive heart failure and progression of the disease process.

VIII. Relationship of acute illnesses to chronic congestive heart failure

A. Discusses the need to avoid persons with infections.

B. Discusses the need to seek early medical care for acute illness such as influenza and respiratory infections.

C. Discusses the fact that additional illnesses add an additional workload for the heart.

D. Discusses the risks of across-the-counter medications.

E. Discusses the need to examine medication labels to determine salt content.

Appendix J

IV. DETAILED NURSING CARE PLAN

ASSESSMENT	ANALYSIS		PLAN		IMPLEMENTATION	EVALUATION
Data Related to Nursing Diagnosis	Nursing Diagnosis: Related to:	Goals: Short and Long Term	Nursing Actions	Rationale for Actions	Nursing Actions Implemented	Extent to which Goals Have Been Met/Changes Indicated in goals or Nsg. Action

Vita